FEASIBILITY STUDY

FOURTH OF JULY CREEK INDUSTRIAL DEVELOPMENT

SEWARD, ALASKA

PREPARED FOR
CITY OF SEWARD, ALASKA
BY
ARCTIC ENVIRONMENTAL ENGINEERS
MARCH 1979

FEASIBILITY STUDY

FOR

INDUSTRIAL DEVELOPMENT

AT

FOURTH OF JULY CREEK

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ANCHORAGE, ALASKA 99502

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CHAPTER 1

INTRODUCTION

Seward has been recognized as a key city for support of the Outer Continental Shelf (OCS) development in the Gulf of Alaska. On shore facilities for industry support and processing will be required, but land for expansion in Seward is extremely limited. The Fourth of July Creek area was annexed by the City of Seward in 1977 because of its potential for development as an industrial park.

This study was funded by the Alaska Department of Community and Regional Affairs under the Coastal Zone Management Impact Program. The primary objective was to analyze the Fourth of July Creek area for its feasibility as an industrial park location, initially to support the OCS oil exploration, development and production program and eventually to handle general cargo and support other industrial activities. The report has been expanded to include other major industries at the site as well as OCS oil exploration. Although the study is primarily factual in nature, several preliminary development plans were prepared and are presented for analysis of costs.

CHAPTER II

SUMMARY

The Fourth of July Creek area has excellent potential for development as an industrial park. Some of the many outstanding features of the site are: excellent soils, availability of good water, ease of waste disposal, availability of good fill material at the site, moderate climate, large waterfront area with deep water for port facilities, moderate tides, and good wind conditions for air emission dispersion. The site is located near the business and residential areas of Seward with existing health, school, police, fire and other services and established telephone and electric utilities. Rail, highway, air and sea-going transportation are all available in the area.

The area also has disadvantages that must be overcome and these include location in a Zone IV seismic zone, potential for coastal and creek flooding, restrictions imposed because of salmon use of the creek, possibility of minor submarine landsliding at the shorline, avalanche danger on the south wall of the valley, no existing access to the area, lack of local construction labor in certain trades and insufficient housing to absorb a rapid population growth. These disadvantages can be overcome with proper planning and engineering and do not significantly detract from the site's suitability.

Costs for developing the site are high, ranging from $20 million to $35 million for basic utilities and access, depending on the industry selecting the site and its needs. The first industry to locate at Fourth of July Creek must be a large industry capable of absorbing the high opening costs. Funding is available for some of the development costs and other costs may not need to be borne directly by industry, so the initial costs to industry to open the site will be significantly less than the figures mentioned above. The actual feasibility of the Fourth of July Creek area as a site for any specific industry will depend on the industry's economic situation and the amount of city, state and federal funding available.

Four types of industry have been analyzed as potential candidates for locating at the site including fisheries and harbor facilities, petrochemical industries, bulk handling facilities and heavy industrial development. Fisheries development is a very viable alternate for the Fourth of July Creek area. A small boat harbor, ship repair yards and a hatchery are compatible with fishery development. The site is capable of supporting petrochemical industry in a number of ways including material handling, storage areas and processing. This report analyzed a refinery at the site

utilizing both the valley floor and the upper "bench" area. Bulk material handling facilities at the site could receive coal, ore, or other materials from interior Alaska by rail, stockpile the material and load vessels for transport to world markets. When Alaska's resources are developed there will be a need for a facility of this type as none now exist. Finally, the report addressed a heavy industrial facility at Fourth of July Creek. A metal refinery was chosen as the specific industry because of resources availability and the ideal location for sea transportation. The site has high potential for this type of industry.

CHAPTER III

REGIONAL SETTING

The Fourth of July Creek study area is located across Resurrection Bay from Seward in South-Central Alaska. Resurrection Bay of the Gulf of Alaska is a deep water bay surrounded by mountainous terrain on the southeast coast of the Kenai Peninsula. Figure III-1 shows the vicinity and Figure III-2 shows the study area at Fourth of July Creek.

The area has a maritime climate influenced by the warm Japan Current. Tides in Resurrection Bay are not so extreme as found at Anchorage, and are similar to those occurring at Seattle. The Seward region is seismically active and is classified as a seismic Zone IV, the same as Anchorage.

Seward and the Fourth of July Creek area are remote from the population centers of the rest of the United States. Within the State of Alaska, however, only Seward and Anchorage are served by all major forms of transportation: air, highway, rail and water.

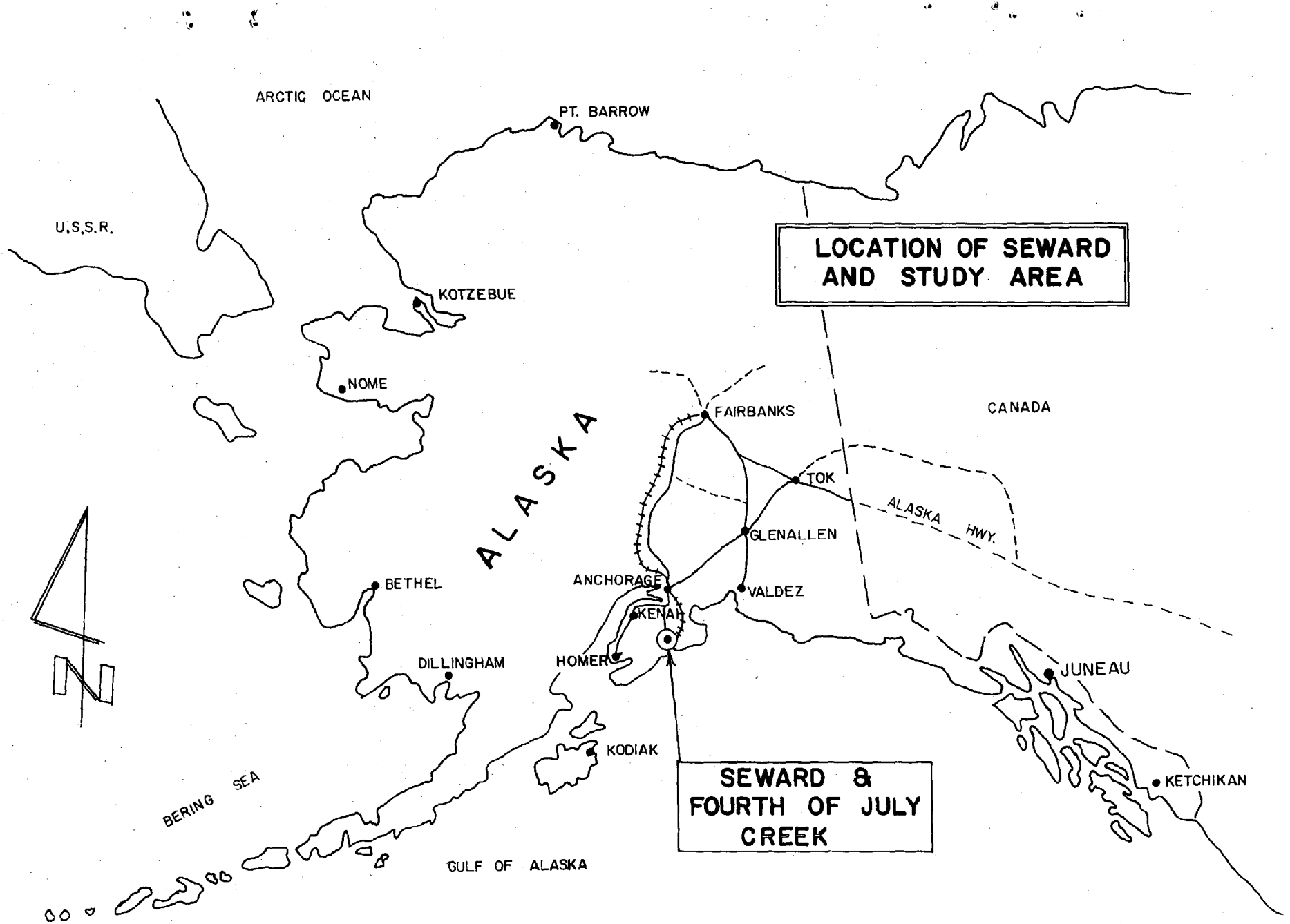
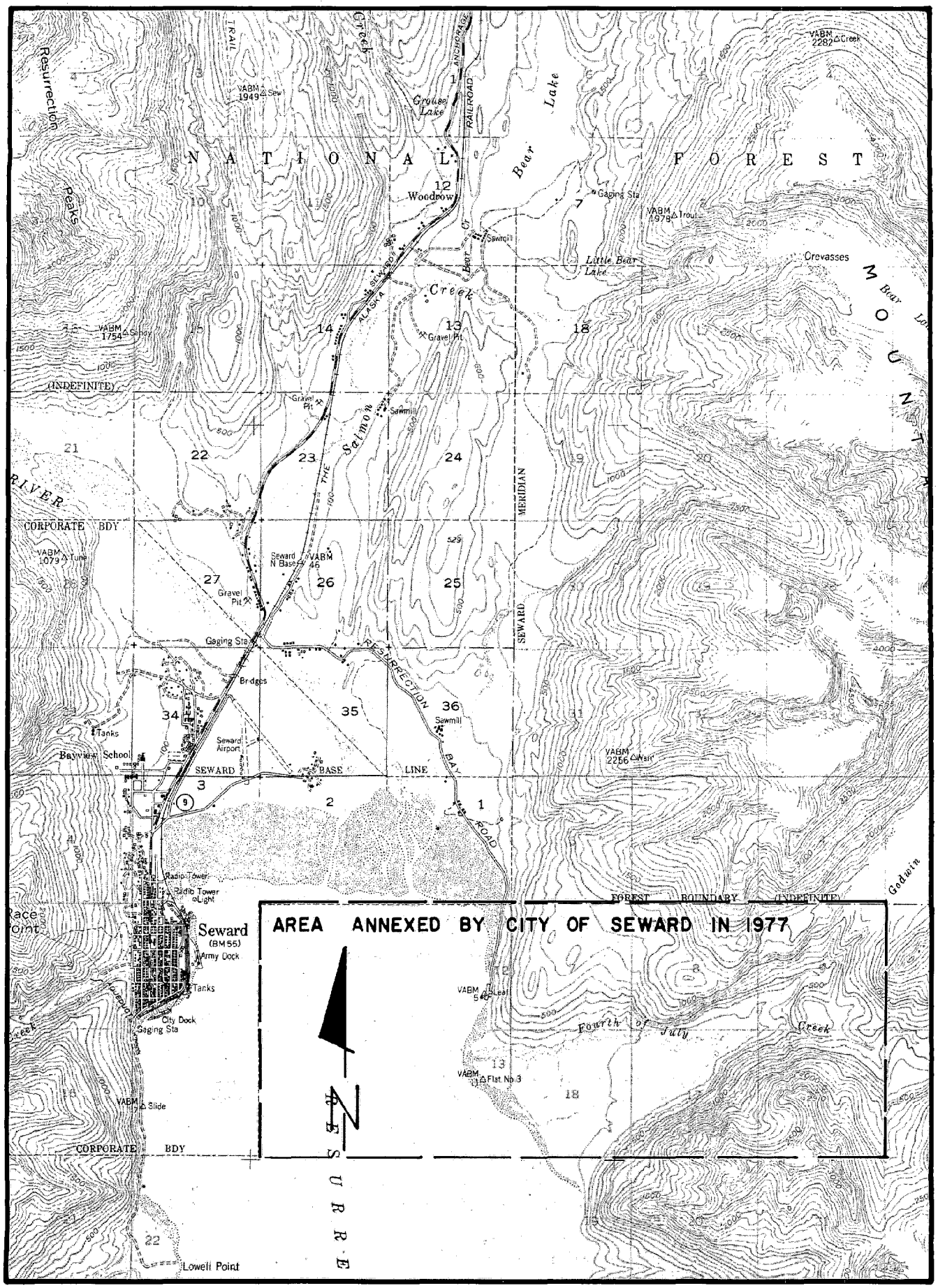

ARCTIC OCEAN
PT. BARROW
U.S.S.R.
LOCATION OF SEWARD AND STUDY AREA
KOTZEBUE
NOME
FAIRBANKS
CANADA
ALASKA
TOK
ALASKA HWY.
GLENALLEN
BETHEL
ANCHORAGE
VALDEZ
KENAI
DILLINGHAM
HOMER
JUNEAU
KODIAK
SEWARD & FOURTH OF JULY CREEK
KETCHIKAN
BERING SEA
GULF OF ALASKA

FIGURE - III-1



FOURTH OF JULY CREEK STUDY AREA - FIGURE III-2

CHAPTER IV

CITY OF SEWARD

HISTORY

Seward was established in 1903 by a group of individuals who proposed to construct a railroad to the coal and gold fields of the interior. The railroad construction provided an economic base for growth and in 1912 Seward was incorporated as a first-class city. Construction and financing problems defeated the railroad after nearly one hundred miles of track had been laid, and in 1915 the U.S. Government purchased the line. By 1925 the railroad was extended to Fairbanks.

After the railroad's completion, Seward experienced a slow but steady growth until the late 1950's. Many of the public works and railroad rehabilitation projects started in the early 50's were completed at this time resulting in a rapid decline in employment. The 1964 earthquake destroyed approximately 90 percent of Seward's industry, including the fish processing plants, railroad yards, fishing fleet, docks, warehouse and oil tank farms. Employment plunged after the earthquake and did not regain pre-earthquake levels until 1974.

GOVERNMENT

Seward is located within the Kenai Peninsula Borough. The Kenai Borough is a second class borough with areawide powers for education, planning, platting, zoning, tax assessment and collection, and solid waste disposal. The City of Seward has advisory review authority for planning, platting and zoning.

The City of Seward was incorporated in 1912 and is a homerule first class city. Seward exercises the powers of police and fire protection, boat harbors, ports, road maintenance and health facilities. The city also operates electric and water utility services. Seward has a council-manager form of government composed of six elected council members, an elected Mayor and an appointed City Manager.

Seward's 1978 fiscal year city tax rate was 13.5 mils, with the borough tax set at 5 mils. The general obligation bonded indebtedness of Seward for fiscal year 1978 was 4.2% of assessed value. Revenue bonds accounted for an additional 1.9% of assessed value.

POPULATION

The current population of Seward is estimated to be approximately 2500 persons. The average household size is 2.8 and the average age is 31 years. Seward's population has a higher percentage of over 60 citizens than Alaska as a whole. The population has grown at a relatively constant 3% per year since the mid 1960's. The population of Seward is rather stable and the average resident has lived in Seward more than 13 years.

EMPLOYMENT

Seward's economy is based primarily on the natural resources of the area (timber and fishing), tourism, and on Seward's role as a major port facility. The Alaska Skill Center and the hospital/ nursing home are also major employers.

Seward has a relatively high unemployment rate, but the labor force participation rate has increased steadily in recent years. Relatively little of the population is employed in contract construction.

HOUSING

Approximately two thirds of the dwelling units in Seward are conventional single family homes. The remaining third is comprised of multi-family dwellings, mobile homes and other. The vacancy rate was 4.3% in 1976. Seward has a very low rate of new housing starts and a majority of units are older homes. Housing for any population growth will require new housing construction. Sufficient land for a population of about 15,000 does exist in Seward and along the highway north of the City.

TRANSPORTATION

Seward is connected to Anchorage and Kenai via the Seward Highway. Anchorage is approximately 130 miles away and Soldotna, 95 miles. The Seward Highway is part of the Federal Aid Primary Road System with an estimated capacity of 14,000 vehicles per day. The annual daily traffic now averages 800 to 3,000 vehicles per day. The State of Alaska Six Year Capital Improvement Program lists numerous reconstruction projects for upgrading the Seward highway to a 40-foot wide section consisting of two 12-foot traffic lanes and two 8-foot paved shoulders.

Seward is the southern terminus of the Federally owned Alaska Railroad. The railroad operates a break-bulk port which handles equipment, palletized material and other large items. The railroad has a 300 acre reserve, 100 acres of which are available for

development. The railroad handled an estimated 350,000 tons in 1976 and could handle considerably more. The Alaska Railroad indicates that three to four 5,000 ton freighters can be handled per day. If a unit train concept is utilized, 5,000 ton trains can depart every four hours.

Seward has several major docks: the Alaska Railroad dock (2-600 foot berths, 1-200 foot berth, 35 feet deep), the City dock (berth for 100 foot vessels, 13 feet deep) and the Fourth Avenue dock (berth for 400 foot vessels, 80 feet deep). The Alaska Railroad east berth has two cranes with capacity of 45 short tons and 105 foot radius reach. The railroad has 24,000 square feet of warehouse and 112,000 square feet of paved outdoor storage area. Mobile cranes up to 140 ton capacity are available.

Seward is served by a general aviation airport constructed and maintained by the Alaska Department of Transportation, Division of Aviation. There are two asphalt runways, the primary one is 4540 feet long and 100 feet wide while the secondary is 2300 feet long and 75 feet wide. A small asphalt apron exists just west of secondary strip. Runway lights are the medium intensity type. No navigation or approach aids exist so the airport is closed when conditions fall below those required by Visual Flight Rules operation.

Traffic at the airport consists primarily of private light aircraft operations although Alaska Aeronautical Industries (AAI) does provide commuter service between Anchorage and Seward. AAI uses twin turbine engined DeHaviland otters as their commutor craft. Lear jet executive aircraft and Hercules cargo craft have landed on the airstrip under private contract, however, the primary strip is too short to obtain FAA approval for scheduled flights of these and similar types of aircraft.

SCHOOLS

Seward has both elementary and high schools. A new high school with a capacity of 300 students have been recently completed. The elementary school has a capacity of 500 students. Enrollment is about 60% capacity at each school and both schools can absorb a substantial amount of growth.

The Alaska Skill Center has operated in Seward for a number of years providing training in the building trades, food services, office occupations, mechanics, and oil field utility and technical skills. The Skill Center has a capacity of 200 students and provides room and board for the students.

HEALTH

Seward's General Hospital has 33 beds and the occupancy rate has averaged about 18%. Based on national hospital standards, the capacity of the hospital is adequate for a population of about

5,000. Both in-patient and out-patient care is provided; X-ray, emergency, and laboratory facilities are adequate to serve the existing population. Emergency evacuation service is available to Anchorage and volunteer ambulance service is provided for the Seward area.

With additional population growth, Seward will need additional dental facilities and an expanded public health service office. There are two doctors in Seward whose current case loads are said to be near capacity.

POLICE & FIRE PROTECTION

Seward has a police department sufficient for a population of 3,000 persons. It operates on a 24-hour basis. The fire department has a full-time chief with 20 volunteer firemen. The department has two pumper trucks and a panel truck. Seward has a fire rating of 5.

ELECTRICAL UTILITY

Seward's electrical power is purchased from Chugach Electric via a transmission line which generally parallels the Seward Highway. Seward owns three diesel generators with 5,500 KW capacity for emergency and peak load. The present mainline transformer has a capacity of 5,000 KW.

The capacity of the present system is just adequate to meet current demands. A major upgrading of the system is scheduled to be complete by the fall of 1979. These improvements will include a new transformer and new feeder voltage regulators to increase capacity to 7500 KVA. Future improvements scheduled for 1981 will increase system capacity to a minimum of 12,000 KVA with upwards of 35,000 KVA possible if the demand possibility exists.

TELEPHONE UTILITY

The Alaska General Telephone Company serves Seward and currently operates about 1,300 stations for 800 customers. Long distance communication facilities consist of 26 trunk lines tied to the Anchorage exchange. During normal business hours, they are used at near capacity. The utility indicates it is capable of expanding the system with a lead time of six to nine months.

WATER

Seward has an excellent water system with high volume capacity drawing from a combination of wells and surface supplies. Two high elevation storage tanks provide 600,000 gallons of water storage. The existing system is being expanded and improved

under the guidance of a comprehensive water system plan developed in 1975. Additional mains into industrial areas and more storage capacity are now being designed. The system is being upgraded to accommodate a population of 10,000.

WASTEWATER

Seward is provided with a gravity sewer system throughout the community. No treatment is presently provided and raw sewage is discharged into Resurrection Bay through five outfalls. The City has adopted a Comprehensive Wastewater Facility Plan to meet current Federal Regulations requiring secondary treatment. Engineering design has begun on approximately seven miles of new interceptors, pump stations and an aerated lagoon system to be located at Lowell Point, south of the City. Construction is scheduled for 1979 thru 1980. The interceptor system is being designed for a saturation population of 20,500 while the treatment lagoon will be initially constructed to meet the requirements of 5,000 with future expansion to accommodate a population of 10,000.

CHAPTER V

PHYSICAL ENVIRONMENT

The purpose of this chapter is to summarize all the major factors regarding the physical and biological environment of the Fourth of July Creek area. Knowledge and understanding of the physical environment is a prerequisite for the proper growth of the study area. Knowledge of prevailing climatic conditions can help prevent excessive air pollution. Understanding the area's geology can assure adequate water, firm building foundations and safety from floods and avalanches. The information presented here comes from many sources and is only a summary of current knowledge. For more detailed information the reader is referred to the bibliography.

TOPOGRAPHY

The study area occupies approximately 1800 acres of land located at the head of Resurrection Bay almost directly across from Seward on the Fourth of July Creek delta. The area is surrounded by rugged mountains and the potentially developable land lies in two distinct areas. The larger (lower area) incorporates the Fourth of July Creek valley plain. This land slopes to the west from elevation 200 feet at the base of the mountains to sea level at the shoreline. No bluffs occur at the bay and the lowland has a gentle gradient over its entire area. The usable valley floor with Fourth of July Creek remaining at its current location comprises approximately 650 acres of the study area. If the creek is relocated, the area has approximately 700 acres of usable land.

The second developable area is a bench located to the north of Fourth of July Creek. This bench is a transitional area between the mountains and the valley floor. The bench slopes gently from elevation 900 at the base of the mountains to elevation 700 feet where a steeper slope drops to the valley floor. The bench covers an area of approximately 400 acres of gently rolling terrain.

The remainder of the study area is comprised of sloping hillsides. A steep slope rises from Resurrection Bay to the bench and a gentler hillside slopes north from the valley floor to the bench. The remaining land included in the 1977 annexation is quite mountainous.

The surface features of the land are best shown by a topographic map of the area (Figure V-1).

The topography of the area influences many of the land development and planning decisions and limits the options available. The greatest problem of development presented by topography will be the steeply sloping hillsides. These lands will not be available for development and present problems for land transportation access.

GEOLOGY AND SEISMICITY

The general geology of the Seward area is related to two principal physiographic provinces. The mountain system is composed of sedimentary marine rocks while the valley system is composed of sediments related to the glacial, fluvial and marine depositional history of the valley.

Bedrock is chiefly two types of moderately metamorphosed rock: phyllite and graywacke. Phyllite is a low grade metamorphic rock derived from silty shale. Graywacke refers to a sedimentary rock consisting of sand sized grains with a fair amount of fine grains. The bedrock in the area was deposited during the Upper Cretaceous age (70 to 90 million years ago).

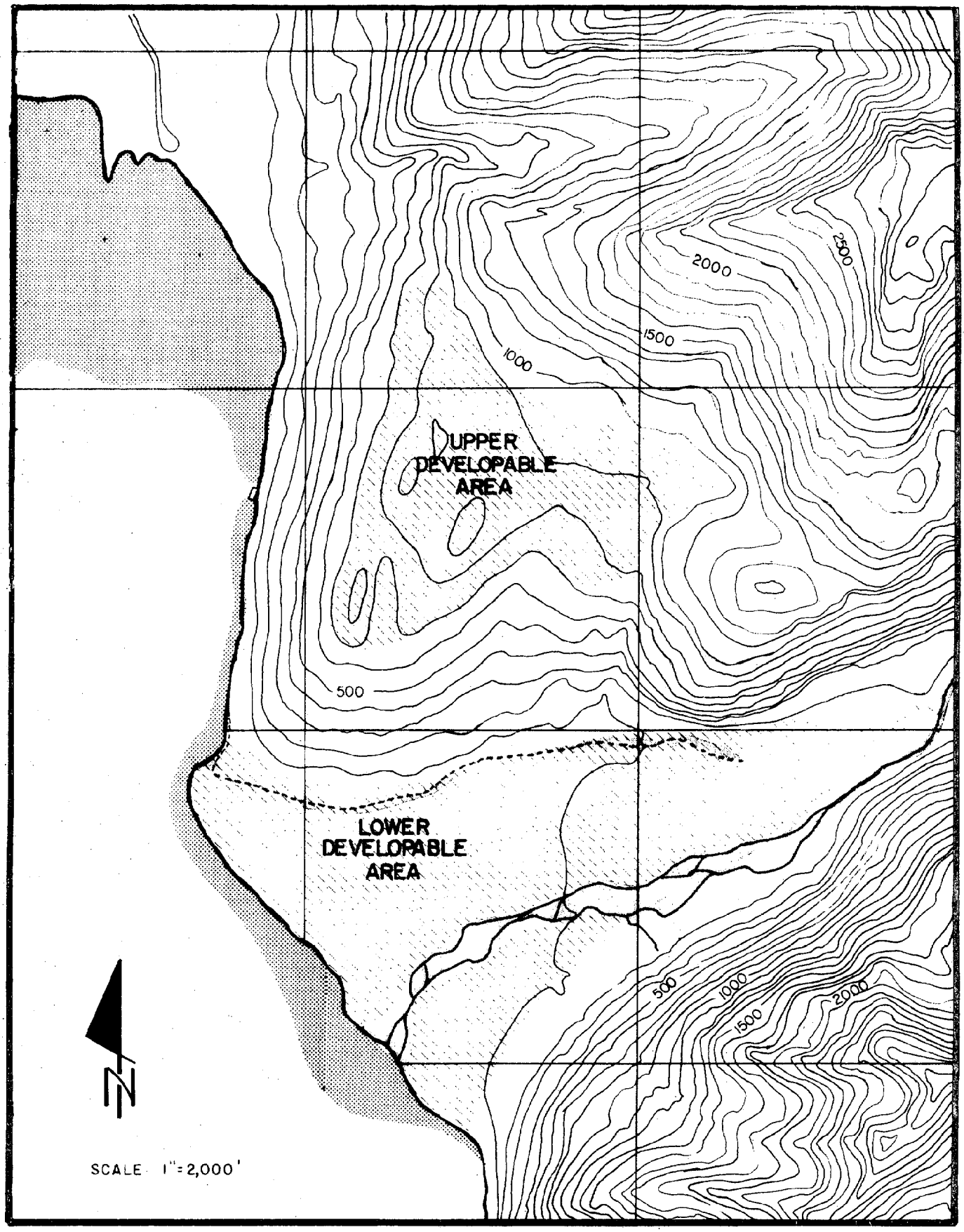
Glacial deposits are mostly lateral moraines of loose silt, sand and gravel with minor amounts of clay cobbles and boulders. Deposits of stratified glacial sediment occur locally at the surface. After retreat of glacial ice from Resurrection Bay, streams began depositing alluvial fans at the mouths of tributary valleys. The fan at Fourth of July Creek is loosely compacted deposits of sand and gravel with minor amounts of clay, silt, cobbles and boulders.

The steep underwater face of the fan at Fourth of July Creek suffered submarine landsliding during the 1964 earthquake. "By analogy to the Lowell Creek fan-delta, it may be speculated that further submarine landsliding offshore from the site could occur in the event of another large earthquake". [1] Further site specific geological information is presented in Chapter VII "Geotechnical Survey and Evaluation".

CLIMATE

Resurrection Bay is a large deep natural water harbor. The area

[1] From Reference 1, Page 44



FOURTH OF JULY CREEK — TOPOGRAPHIC MAP
FIGURE V-1

benefits from the relatively warm Japanese current that generally warms the Gulf of Alaska area producing a maritime climate for the Seward area. The climate is typified by cool summers, mild winters and large amounts of precipitation. A weather station exists in Seward but no information is available for Fourth of July Creek. The weather should be very similar. A chart of Seward temperature and precipitation is presented in Table 1.

Temperatures for the area are relatively mild with minimal daily variations. Average temperatures range from 25 degrees F. in January to a summer average of 56 degrees in July. During July, daytime highs often reach 67 to 75 degrees F.

Seward has a relatively high average annual precipitation of 66 inches. Most of the precipitation falls as snow; average annual snowfall at Seward is 80 inches.

Prevailing winds are from the north in winter and from the south in summer. In spring, morning winds are from the north and from the south in the afternoon. Fall winds come primarily from the west or northwest.

Resurrection Bay, and the rivers, valleys and passes at the north end of the bay comprise a system for which general conditions of surface wind may be predicated and analyzed. Members of the U.S. Weather Service in Anchorage, Alaska have both studied and produced equations, charts, papers, and other aids to determine the wind velocity both in the passes, and in Resurrection Bay. Wind in Resurrection Bay has been forecast using these techniques for several years and experience has proven these forecasts reasonably correct.

A meteorological data review indicates that the head of Resurrection Bay around the airport and actual city site is a wind "dead" area compared to surrounding areas. The "bench" at Fourth of July Creek appears to be ideally situated to receive constant flushing by winds. The valley has conditions similar to the City of Seward. A senior meteorologist at the National Weather Service in Anchorage, Alaska, stated that the flat promontory (bench) north of Fourth of July Creek would continually be swept clean by the winter winds and would have the best location for diffusion by the summer breezes. Summer diffusion would be accomplished through south wind convection mixing as it progresses inland. Mixing would continue from the shore to the top of the passes. The evening breeze would tend to disperse any "plumes" along the east side of Resurrection Bay. Winter dispersion would be directly to sea by the prevailing north wind.

TABLE 1

TEMPERATURE AND PRECIPITATION
SEWARD, ALASKA

Month	Mean Temperature degrees F.	Total Precipitation inches	Total Snowfall inches
January	24.7	5.03	17.4
February	27.8	5.22	17.4
March	30.6	3.60	11.4
April	37.9	4.25	7.3
May	44.7	3.39	0.2
June	51.7	2.22	0
July	55.5	3.10	0
August	55.4	5.82	0
September	49.4	9.38	Trace
October	40.4	10.38	1.0
November	31.2	7.26	6.7
December	25.1	6.68	19.1
ANNUAL	39.3	66.33	80.5
Years of Record	44	43-48	47

Source: U.S. Department of Commerce, Climatic Summary of the United States, 1965

MARINE

Resurrection Bay is a finger of the Gulf of Alaska occupying a deeply eroded glacial valley. The bay is approximately 2½ miles wide at Fourth of July Creek with steep mountain fronts on each side. Steep submarine slopes are present at its margins and water depths are as great as 600 feet off the site. A shallow tide flat exists at the head of the bay extending south for 3,000 feet where it meets a steep submarine slope to 300 feet.

The tidal range at Seward is 10.5 feet from mean higher high water to mean lower low water. Extreme tides recorded are high of 14.8 and low of -4.2. No data exists on longshore or tidal current patterns.

Detailed data on bottom sediments are not available but an NOAA nautical chart shows soft mud about 1½ miles offshore from the site and "hard" just offshore from the edge of the intertidal zone. "Tentative interpretation is that the underwater surface of the alluvial fan-delta is swept clean of clay and silt by tidal currents and/or density currents, whereas the deep bay bottom at the foot of the delta is probably covered by soft clay and silt deposits, or possibly by landslide deposits from the fan-delta". [2]

Minimum water depths of 50 feet at mean lower low water occur within 400 feet of shore. An adequate turning basin for vessels exists without interfering with vessel routes to the city harbor. No natural shelter exists at the study site, but a dock system may be constructed that allows vessels to remain with long axis parallel to winds and wave action.

WATER

This study assumes adequate water exists in the immediate Fourth of July Creek area, and this is being confirmed by a USGS study. Field testing for the USGS study will begin in late summer, 1979. In the event that extreme quantities of water are required, sources at the head of Resurrection Bay may be tapped.

Fourth of July Creek is fed by melt-water from several glaciers high in the Chugach Mountains. The developable area at the site is situated so that run-off flows westward through the valley where it is available for use. However, withdrawal from the creek

[2] From Reference 1, Page 46.

may be restricted or prevented during certain times of the year because of salmon egg incubation. Very limited data is available for discharge volume or water quality. The Alaska Division of Geological and Geophysical Survey estimated the stream flow between 30-50 cfs in October, 1976. In October, 1978, a measurement was taken which showed a flow of 120 cfs at the mouth of the creek. Considerably less volume would be expected in the Winter.

No wells have been located at the study site so specific information is not available on well production. The water table is fairly shallow as discussed in Chapter VI "Geotechnical Survey and Evaluation". By analogy with the Jap Creek fan at Seward and the Resurrection River alluvial plain, good quantities of groundwater should be available anywhere in the floodplain.

The factors to be considered in site planning directly related to water resources are protection of the recharge zone and protection from contamination. The principal recharge areas are the alluvial fan of the creek and the mountain fronts. Stripping vegetation and paving will increase run-off and reduce recharge. Development must leave sufficient recharge area in its natural state. It may be advantageous to locate some material borrow pits at the head of the valley to further enhance recharge.

FLOODPLAIN INFORMATION

The Fourth of July Creek valley is a natural drainage basin originating at several glaciers in the Chugach Mountains. The creek flows west for 4.5 miles with a drainage area of approximately 27 square miles. The drainage basin is comprised primarily of steep mountainous slopes and glaciers.

Fourth of July Creek is glacial fed and has a braided channel. The floodplain through which the channel migrates is composed primarily of silt, sand, gravel and boulders. The vegetation of the basin is represented by heavy timber and brush.

The creek is subject to floods and these occur primarily in the early spring or late summer and fall. The floods are the result of several factors, including snow melt and precipitation during rapid run-off from heavy rains. Because the basin is small the flood stage can crest and fall within a few hours.

No specific floodplain information is available for Fourth of July Creek, but the U. S. Army Corps of Engineers has completed a detailed "Flood Plain Information" study for the area at the head of Resurrection Bay. Much of this information is useful

for correlation as the same general conditions occur at Fourth of July Creek.

Brush and debris accumulation in and along the stream bed greatly increases the potential for flooding. During floods, these obstructions impede flood flows creating backwater and higher flood stages. Any development reducing channel section or increasing channel resistance may increase the potential for flooding.

Due to the area's location at the head of Resurrection Bay, it is subject to the potential for coastal flooding. Coastal flooding can result from either storm driven waves or tsunamis.

The area is in a zone of relatively high earthquake probability with resultant tsunamis. Major tsunamis occurred during and immediately following the 1964 earthquake. Wave run-up at the Fourth of July Creek alluvial fan varied from 23 feet at the north end to 18 feet at the south end. The probability of a tsunami occurring is less than the probability for a once in 500 year flood (2/10 percent probability of occurrence in any one year). "Coastal storms are a much more frequent event than tsunamis and therefore were used as the basis for determining the coastal high hazard zone".[3] The U.S. Army Corps of Engineers has not defined the coastal high hazard zone for Fourth of July Creek. However, the zone must be the 10 to 12 foot elevation contour the same as Seward proper and the rest of the area at the head of Resurrection Bay.

WILDLIFE [4]

The Fourth of July Creek area is presently an undeveloped area. Logging has taken place in the valley and a network of gravel logging roads have been constructed. The area is considered to be black bear and moose habitat and winter mountain goat range. The area is not critical habitat, however, and overall impact on big game habitat would be minor if development occurs.

The site affords no known waterfowl nor sea bird feeding or nesting habitat. Marine mammals, harbor seals, porpoises and sea otters, are common in Resurrection Bay but their use of near site waters is relatively minor. The general offshore area affords a major rearing area and milling grounds for salmon and herring. Resurrection Bay is not an important commercial fishing ground but is a significant recreational fishery. Dungeness,

[3] From Reference 3, Page 15.

[4] Information presented in this section is derived from a Dept. of Fish & Game "Assessment of Potential OCS Sites" and discussion with a Habitat Protection Biologist.

king and tanner crab and five commercial stocks of shrimp are present in the offshore area.

Fourth of July Creek is classified for anadromous fisheries and is a relatively significant producer in upper Resurrection Bay. The Alaska Department of Fish and Game has indicated their concerns that any development at Fourth of July Creek must not diminish or destroy the spawning capabilities of the stream itself. The creek must be bridged; culvert crossings will probably not be permitted. Water appropriation from the stream will be restricted during the egg incubation - fry emergence period from August to Mid-June.

CHAPTER VI

LAND OWNERSHIP & STATUS

FOURTH OF JULY CREEK

GENERAL

Within the area annexed by the City of Seward only three parcels of land have been patented. The remaining acreage has either been selected by, or selected and tentatively approved for patenting to the State of Alaska. The three patented parcels are Lots 1 and 2 of U.S.S. 3294 and U.S.S. 1651. The land not yet approved for patenting to the State of Alaska consists of three tracts. These include U.S.S. 4828 (unapproved), U.S.S. 4827, and a 5 acre tract in the South-West corner of Section 8, T.1S, R.1E, S.M. The remainder of the land involved has been tentatively approved for patenting to the State.

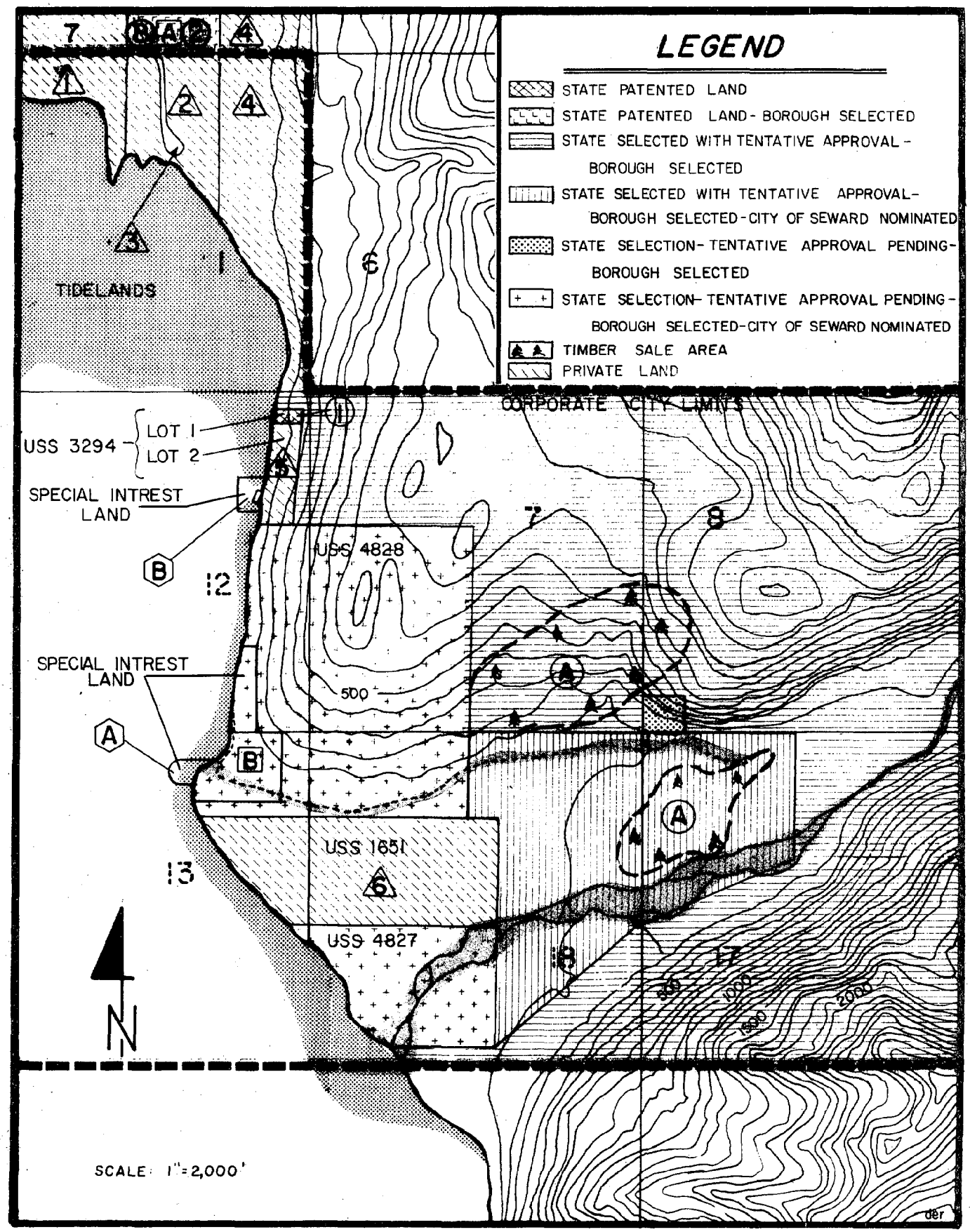
One active mining claim does exist within the area of concern. This consists of part of a claim for six lode claims on the south and north sides of Godwin Glacier.

One timber sale and two tide lands permits are still active within this area. The timber sale and one tidelands permit are expected to be closed out soon.

One Borough land selection, tentatively approved to the State, has been approved. This is the portion contained by A.S.L.S. 76-79. Fifty foot wide easements along each side of Section lines do exist within the annexed land. No platted easements or rights-of-way exist within this area.

LAND OWNERSHIP & INTERESTS

Figure VI-1 is a land status map of the study area. The discussion that follows references this figure and the legend is used as an aid in determining land owners and other land interests. A complete land status map covering a greater area is included in a pocket at the back of this report. Some land parcels discussed will be shown on the foldout map and not on Figure VI-I.



LAND STATUS MAP

FIGURE VI-1

PRIVATE LANDS

All private land is marked with diagonal broken hatching and a number within a triangle. Each parcel is discussed below:

(1) Description: Lot 1, Sec. 1, T.1S., R.1W., S.M.

Owner: Alaska Barge & Salvage
General Delivery, Seward, Alaska

Patented: 11/2/18 to John Nash under Patent 65210

Platted Easements or Rights-of-Way: Nash Road is platted with its R.O.W. touching this property for a distance of approximately 200' along the N.E. Corner.

50' Wide Easement Along Section Line?: Does not exist, this property was patented before issuance of the statute providing section line easements.

(2) Description: NW¼, NE¼, and Lot 3 of Sec. 1, T.1S., R.1W, S.M.

Owner: Dorothy Stewart
3415 S. 184th
Seattle, Washington

Patented: 9/29/29 to Peter Anderson under patent 1025482

Platted Easements or Rights-of-Way: Nash Road is platted a 200' wide R.O.W. part way across this property. This R.O.W. terminates at a point on the south boundary of this property where one side of the road R.O.W. is the tidelands/uplands boundary.

50' Wide Easement Along Section Line?: Does not exist, entry was gained prior to issuance of the statute providing section line easements.

(3) Description: Parcel of land containing less than one acre at end of platted easement for Nash Road on southwest side of easement.

Owner: Nicholas Murawsky
Box 696
Seward, Alaska

Patented: 9/29/29 to Peter Anderson under Patent 1025482

Platted Easements or Right-of-Ways: Nash Road is platted along northeast property line

50' Easement Along Section Line?: Not Applicable.

4

Description: E½, NW¼, and Lots 4 & 5 of Section 1, T.1S., all in R.1W., S.M.

Owner: Virginia Darling
Box 157
Seward, Alaska

Patented: 8/22/1919 to Joseph S. Hofman under Patent 707369.

Platted Easements or Rights-of-Way: None - See part under special easements and rights-of-way.

50' Easement Along Section Line?: Does not exist, this property was patented before issuance of the statue providing section line easements.

5

Description: Lot 2 of U.S.S. 3294 (located in Sec. 12, T.1S., R.1W., S.M.)

Owner: Eugene Hundley
425 145th S.E.
Bellevue, Washington

Patented: 7/9/54 to E.W. Hundley under Patent 1145408

Platted Easements or Rights-of-Way: None see part under special easements and rights-of-way.

50' Easement Along Section Lines?: Not Applicable

6

Description: U.S.S. 1651 (located in Sec. 13 of T.1S., R.1W., S.M. and Sec. 18 of T.1S., R.1W, S.M.)

Owner: Dale Lindsey
Box 367
Seward, Alaska

Patented: 12/20/66 by Robert Lynn Swift, Senior under patent #50-67-0307

Platted Easements or Rights-of-Way: None

50' Wide Easement Each Side of Section Line?: The easement does exist by statue and could be ascertained through the Alaska Division of Lands.

(7) Description: The NE¼ and the S½ of the NW¼ and the SW¼ of Sec. 36 T.1N., R.1W., S.M. as subdivided into 133 parcels and assorted roads.

Owner(s): Not listed herein

Patented: 11/2/18 to John Nash under Patent 652510

Platted Easements or Rights-of-Way: Nash Road has a platted width of 100' (and at some places 200') across this property, other inconsequential subdivision roads are also platted (between 30' and 50' in width).

50' Wide Easement Along Section Line?: Does not exist, this property was patented before issuance of the statute providing section line easements.

STATE PATENTED LANDS

The State has received patent for some land that this report covers. Some of the land has been selected by the Kenai Borough as part of its allotment. These portions are marked with ⁘⁘⁘⁘. The remaining State patented lands have not been requested by any agency or municipal corporation. These are marked with solid cross-hatch lines.

(1) Description: Lot 2 of Section 1 and Lot 1 of U.S.S. 3294 (in Sec. 12), all in T.1S, R.1W, S.M.

Patented: 11/1/63 to the State of Alaska under Patent 1234116

State Classification: None platted

Other Interests: None

Platted Easements or Rights-of-Way: None

50' Wide Easement Along Section Lines?: Exists along the north side of Lot 2, Section 1.

(2) Description: The NW¼, NW¼, the SW¼ and the N½ of the SE½, and the NE¼ of Sec. 36, T2N, R.1W, S.M.

Patented: 8/14/61 to State of Alaska under Patent 122953 (Land Grant for Schools)

State Classification: School use - presently being reclassified.

Other Interests:

a. The Kenai Borough has selected this land as part of its allotment.

b. A "free-use-permit" for the extraction of gravel and sand (for $0.25/cu.yd.) from the S.W.¼, SE¼, of Sec. 36 was given to the Dept. of Transportation. There is no term on this permit. The file on this action is A.D.L., F.U.P. #02425 (marked as Special Interest [A] on the map).

c. The State has sold the timber on the SW¼ and the N½ of the SE¼, Section 36. The present holder of this interest is: Delmar Branson
Box 1071
Seward, Alaska

This interest reverts 9/26/79 unless an extension is granted. The file on this action is A.D.L. Timber Sale 200742. (Marked as timber sale (B) on the map).

Platted Easements and Rights-of-Way: Nash Road crosses the NW¼, NW¼ and the corner of the SW¼, SE¼ of Sec. 36. An "interagency land management transfer" has transferred control of this R.O.W. from the Division of Lands to the Department of Transportation.

50' Wide Easement Along Section Lines?: Does exist at all points where the parcel adjoins the section line.

SPECIAL EASEMENTS AND RIGHTS-OF-WAY:

a. When the U.S. Government transfers title of land to another party a patent is issued. When the patents are issued certain rights are reserved to the federal government. Sometimes these rights are reserved for any governmental body.

All patented land in the area of study has the following reserved rights; 1) all vested and

accrued water rights and rights to ditches and reservoirs used in conjunction with such rights are reserved to their owners, and 2) a right-of-way for the construction of ditches and canals constructed by the authority of the United States is reserved to the United States.

All patented lands studied except privately owned tract (4) also have a right-of-way for the construction of railroad, telegraph, and telephone lines reserved to the United States.

Privately owned tract (5) has two other rights reserved in the patent. These are as follows; 1) a right-of-way is reserved for roads, roadways, highways, tramways, trails, bridges, and appurtenant structures constructed by or under the authority of the United States or the State of Alaska, 2) rights to all uranium, thorium, or other material used to produce fissionable materials along with the right to enter the land, to prospect for, mine, and remove the material is reserved to the United States.

b. An easement for the Nash Road extension across privately owned tract (4) has been provided to the owner of Lot 2, U.S.S. 3294 in return for an annual fee. This easement is transferable without consent of the owner of tract (4), however the easement can be voided by neglecting payment of the annual fee or use of the easement.

LANDS TENTATIVELY APPROVED FOR PATENT TO THE STATE OF ALASKA

Those portions of land marked with a light tint have been tentatively approved to the State and no further interests have been indicated or transferred. Those areas marked with solid line hatching (both horizontal and vertical) have been tentatively approved to the State, and, have been selected by and approved to the Kenai Borough as a part of their allotment. This portion of land has been-surveyed and is recorded as Alaska State Land Survey No. 76-69.

A 5 acre tract within this survey had been withdrawn for a headquarters site at the time the land was tentatively approved to the State. Thus it was not approved to either the State or the Borough. This withdrawal has been closed, and the State has reaffirmed its request for this land.

That portion of land within A.S.L.S. #76-69 and marked with vertical hatching has also been nominated by the City of Seward as part of their allotment. This nomination contains approximately 225 acres in Section 18 and approximately 144 acres in Section 17.

No patent has been received on any of this land to date.

The State sold the timber on a portion of A.S.L.S. No. 76-69 to the Kenai Lumber Co., Seward, Alaska. This interest is expected to be closed out sometime this year. This action is filed under A.D.L. Timber Sale 64634. Location of the sale is noted on the map with two groups of trees marked (A).

LAND NOT TENTATIVELY APPROVED TO THE STATE OF ALASKA

There are three tracts of land the State of Alaska has selected, within this area of study, which the United States Government has not tentatively approved for patenting to the State of Alaska.

Two of these tracts are covered by special surveys. These are U.S.S. 4828 and U.S.S. 4827. They are marked on the status map with +++. Both tracts have been selected by the Kenai Borough and nominated by the City of Seward as part of their respective allotments.

Nikiski Marine Corporation of 111 F Street, Anchorage, Alaska has filed a lease application with the Alaska Division of Lands for a portion of U.S.S. 4828.

The third tract is the 5 acre tract within A.S.L.S. No. 76-69 that was not approved to the State. This tract is still currently under request by the Borough.

The State of Alaska has not and cannot take any action on these requests and applications until it receives at least tentative approval from the federal government on its selections.

The U.S. Bureau of Land Management was (as of 12/5/78) processing these three tracts of land to provide tentative approval to the State of Alaska.

TIDELANDS, MINING CLAIMS, ETC.

1) All tidelands within Sections 1,2,3,10 and a portion of 15, T.1S, R.1W, S.M. have been patented to the City of Seward under Tidelands Patent #232.

2) A tidelands permit covering construction of a log ramp and use of such was given to the Kenai Lumber Co. of Seward, Alaska. (Marked as tidelands permit (A)) for removal of timber taken from timber sale 64634. The term of this lease (tidelands permit 68326) has expired, but the lease has not been closed as of this date. Presently it is expected that this lease will be closed out in conjunction with timber sale 64634.

3) Tidelands Lease 61983 was issued to E. W. Hundley of 1031½ E. 1st Street, Anchorage, Alaska for a five year term beginning on 12/16/74. This lease covers a portion of tidelands adjoinging U.S.S. 3294, Lot 2. It is marked as tidelands permit (B). This lease is presently scheduled to expire on 12/16/79 but may be extended upon request.

4) Four mining claims were found in the area of study, three of which are inactive, and none of which have been patented.

The three inactive claims are not shown on the status map as an inactive, unpatented mine claim does not segregate the land. The inactive claims are listed below:

a. Claim #95-168 located in Sections 15 and/or 16 of T.1S, R.1W, S.M., exact location unknown, mineral claim for copper, last active date - 1908.

b. Claim #95-311 located in Section 12, T.1S, R.1W, S.M. (may be on U.S.S. 3294). One lode claim for gold, last active date - 1961.

c. Claim #95-455 located along Fourth of July Creek, approximately 1/4 mile upstream from the stream mouth and continuing for about 1/2 mile along the main stream, one placer claim for gold, last active date - 1974.

d. Claim #95-162

The active claim is marked as to approximate location by special interest shading and letter [C]. This claim is located along the "North" and "South" sides of Godwin Glacier. It is comprised of 6 lode claims for gold and copper laid out in two sets of 3 claims each. Each claim is 1,500 ft. by 600 ft. The claim is listed as being owned by:

Auther W. Smith

Box 472

Woodstock, Virginia 22664

ADDENDA TO CHAPTER VI

After this report had been prepared but before it was printed in its final form, the land status in the Fourth of July Creek area changed. The three parcels of land which had been selected by the State of Alaska but had not yet received tentative approval (T.A.) for patent to the State, have now been given T.A. A letter from the Bureau of Land Management to the State of Alaska giving T.A. is included in the Appendix.

CHAPTER VII

GEOTECHNICAL SURVEY & EVALUATION

The Fourth of July Creek area which may be suitable for industrial development consists of two distinct and separable areas. The first is the historical flood plain of the creek, while the second is a bench to the north of the valley at about 600' to 1000' elevation M.S.L. The foundation materials of these two areas are distinctly different. The creek valley plain, with bedrock between 30 and 100 feet below the surface, presents a foundation material consisting of alluvial sands and gravels. The "bench" to the north of the valley appears to have only a thin surficial covering of soil and glacial till, presenting a foundation material consisting chiefly of sound bedrock.

Valley Foundation Material

The valley alluvium appears to be composed of coarse sands and gravels with some silt. The material in the head of the valley appears to contain coarser and somewhat denser materials (including cobbles and boulders) than the beach.

The entire valley floor provides an excellent site for an industrial development. The density and coarseness of the material in the head of the valley indicates that shallow spread footings would probably be sufficient for most building or reservoir construction, and high point load systems such as silos, towers, or stacks could probably be founded on heavy spread footings or shallow piers. The appearance of loose to medium sand near the beach indicates that high point load systems may need to have the overlying sand densified to prevent excessive settlement and differential movement of the foundation during seismic tremors. The shallow water table near the beach indicates that underground construction in the beach area may encounter some problems with saturated sands, whereas the area more towards the head of the valley should not have many problems related to high water table. There is a 200' to 300' zone of land at the beach line on the creek delta that should be set aside for non-critical structures and usage due to the submarine landslide potential in the event of a major earthquake.
Test borings, seismic profiles, and visual observation indicate a lack of permafrost or subsurface ice inclusions in the main portion of the valley.

Although the conditions encountered in this area appear "good-to-excellent" for foundation material, good engineering practice dictates that site specific investigative work should be done prior to the design of any project in this area.

"Bench" Foundation Material

The bedrock in this area is often exposed, and should always be considered in close proximity to the surface. The bedrock consists of interbedded phyllites and graywackes. The foliation strike is about north-south with a dip of 85 degrees.

These conditions indicate that this area is excellent for high point-load systems, as the surface velocity (12,000 ft/sec.) indicates good sound bedrock. The orientation of the bedding and dip indicate ease of construction and probable stability of cut shelfs or "stepped" foundations in the bedrock.

The high velocity associated with this bedrock precludes the use of ripping as a means of removing material. This indicates a probable high foundation preparation cost for structures not designed to fit existing contours. This also tends to indicate a high cost for construction of underground utilities. However, the elevation of the "bench" and the close proximity of bedrock foundation materials make this location excellent for chimney stacks, gravity reservoirs, and communication towers, or any other system utilizing an elevation differential.

Geotechnical Study

The firm of C.C. Hawley & Associates performed a two-stage survey of the Fourth of July Creek area. The first stage provided visual and seismic inspection of the general area. The second provided soils borings to check the seismic probe accuracy and investigate more fully the soils in the valley flood plain.

SEISMIC & VISUAL SURVEY

Subsurface Studies

Three seismically distinct materials are present under the site. A two to ten foot thick layer of loosely compacted alluvium has a seismic velocity of 2,000 ft/sec. Deeper alluvium is water saturated and has a velocity of 4,000-5,000 ft/sec. Bedrock has a velocity of 10,000 to 12,000 ft/sec. Refraction profiles were run at four sites using a signal enhancement, hammer seismograph. Line A indicated a depth to bedrock of 60 feet. The depth to bedrock under line B was 50 feet. Line C is underlain by more than 100 feet of water saturated alluvium. The alluvium thickens from 30 feet near the valley sides to more that 100 feet near the shoreline in the center of the valley. There was no indication of frozen soil under any of the seismic profiles.

Bedrock

The bedrock near Fourth of July Creek is an imbedded series of phyllites and graywackes. The foliation strikes roughly north-south, with a near vertical dip. This orientation eliminates the possibility of large scale slab-type rockslides on either the north or south sides of the valley. A short refraction profile was run across the top of the bench, north of Fourth of July Creek. A surface velocity of 12,000 ft/sec. was confirmed by pulling away moss to expose bedrock. Outcrops of interbedded phyllites and graywackes across the top and sides of the bench confirm that it is indeed bedrock, and not a glacial moraine. A small hill of metasandstone protrudes through the alluvium near the junction of the two mainstream channels about 1 mile up the valley.

Characteristics Of The Valley Fill

The Fourth of July Creek alluvium is a coarse gravel with sand and silt. The gravels contain a significant number of cobbles 4" to 8" across and numerous boulders greater that 10". The gravels are composed of the phyllites, metasandstones, and graywackes of the area. They exhibit the parting characteristic of bedrock by being flattened in one dimension. The valley fill tends to fine toward the beach and the beach itself is quite sandy.

Permafrost And/Or Residual Glacier Ice

The possibility of the occurrence of permafrost and/or residual bodies of glacier ice in the Fourth of July Creek basin was considered. The relatively warm marine climate of Resurrection Bay area, the good southwesterly exposure of the basin and the coarse free-draining material of the floodplain all indicate that permafrost is highly unlikely. Furthermore, surficial evidence of permafrost or massive ice such as patterned ground, sand boils, kettling, or standing water tables was not in evidence. Finally, the preliminary subsurface seismic profiles showed no velocities typical of ice or ice-rich soils. We conclude that the Fourth of July basin is essentially ice-free.

Avalanches and Rockslide Danger

The southern margin of the Fourth of July Creek valley plain is bounded by a very precipitous ridge which rises nearly 3,000 feet in about a half mile. The ridge crest is shaped by three distinct cirques which are the source of several stream channels which drop into the valley below.

Old avalanche scars can be seen in and adjacent to the larger channels that are the primary feeders from the cirques above. A recent avalanche (primarily snow in this case) probably occurred in the late spring of 1978. Although the snow had melted back considerably, it appeared that the slide probably ran out about 200 feet from the valley wall. An accompanying blast of wind blew down a grove of spruce trees (some with butts up to 18") about 400 feet from the valley wall.

Snowslides or avalanches can be expected to continue along the valley wall in the future. Rockslides are also possible but less likely as the strike of the rock units in the area and the general competency of rocks precludes slabbing and mass wasting. We recommend that a 500 foot safety zone be established along the base of the southern valley wall to restrict the building of permanent structures.

Groundwater

The valley fill, being coarse with few fines should be especially permeable, and fresh goundwater should be obtained in good quantity almost anywhere on the valley plain. Bearing this out, fresh water springs were noted at several points within 300 feet of the beach.

SOILS BORINGS

A Nodwell-mounted CME 55 drill rig was used to drill five holes from 30 to 50 feet in depth. The hole locations were selected to provide an overall view of the type and thickness of the alluvial deposits. Both drive and grab samples were taken. Drive samples were obtained using a 140# hammer and a 1.4 inch split spoon sampler. The test hole logs are included in the Appendix. Figure VII-1 shows where the holes were located.

Description of Soils

In general, the bore holes indicate that the valley fill is composed of coarse sands and gravels, with numerous cobbles. Field logs are attached. Holes No. 1 and 2 were located toward the head of the valley. The soils in No. 1 consisted

of sand with some gravel overlying alternating units of sandy gravel with a trace of silt, and sand with a trace of silt and gravel. Hole No. 2 encountered silty gravel with some sand which overlaid gravel with some sand and silt.

Hole No. 5 was located in the northcentral portion of the valley fill. The hole was placed on a recently abandoned stream channel. The soil consisted of sandy gravel with some silt.

Hole No. 3 was located at high tide line and encountered finer soils primarily consisting of sand with some gravels. This material has probably been reworked by longshore currents. Hole No. 4, 200 feet behind the high tide line, encountered much coarser material in the form of numerous cobbles and gravel. These coarse materials were most likely deposited in a main channel of the now abandoned stream bed.

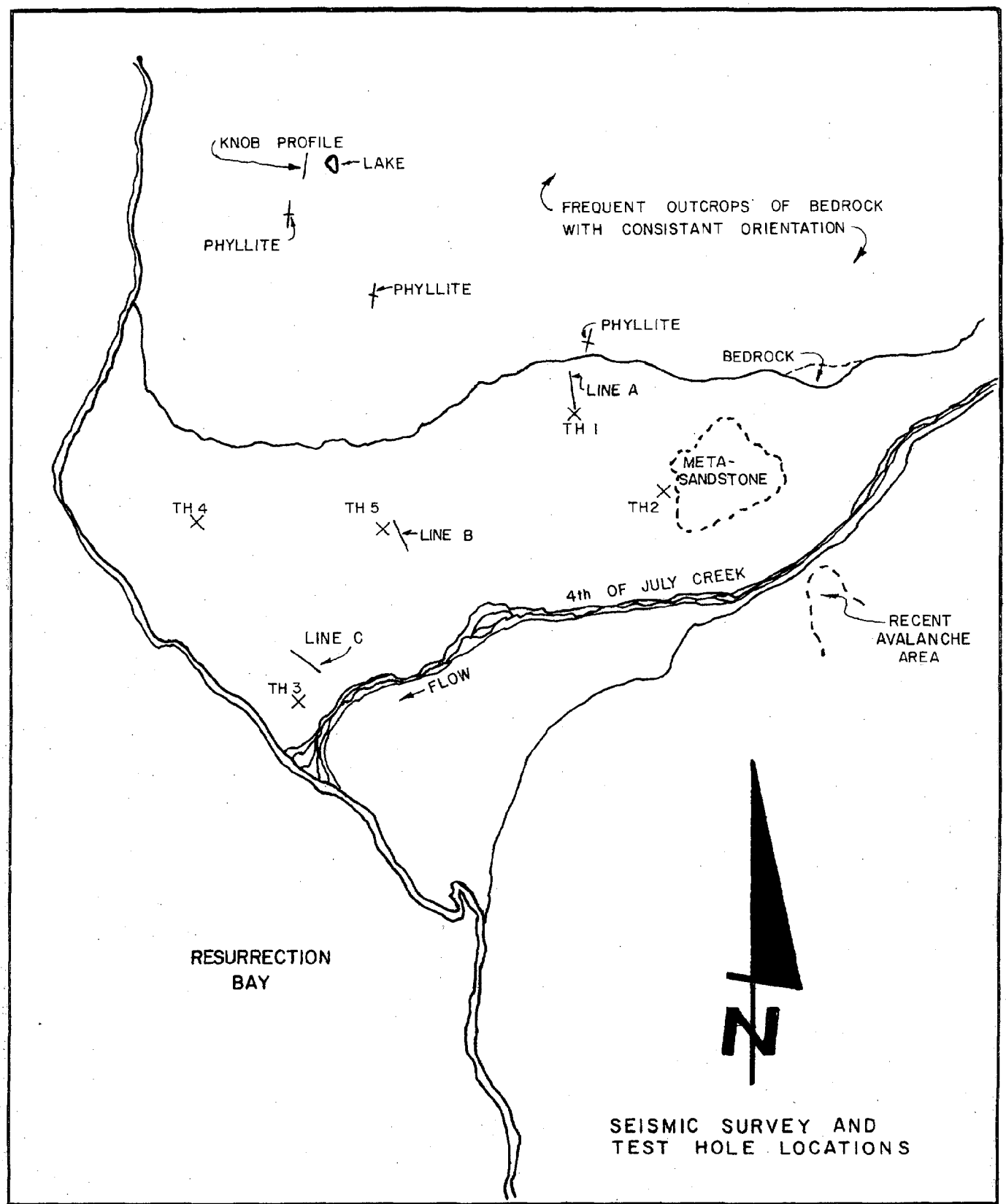
Bedrock was not encountered in any of the test holes. Neither ice nor permafrost was present in any of the holes.

Water Table

Water tables ranged from 9 feet in depth near the beach to 31 feet in depth in the upper portion of the valley. Because of the uniformly coarse and permeable nature of the gravels in the valley, the water table is probably a continuously sloping planar feature that rises away from sea level at a slightly lesser gradient than the valley fill itself. Several fresh water springs in the back beach area indicate that the water table intersects the surface here.

Conclusions

The results of this drilling program indicate that the valley fill of Fourth of July Creek near Seward has uniformly favorable characteristics for the placement of stable foundations. Further site specific work will be necessary before actual construction takes place.



SEISMIC SURVEY AND TEST HOLE LOCATIONS

REVISION	DATE	BY

Arctic Environmental Engineers
Anchorage, Alaska

PROJECT NO.
DRAWN:
CHECKED:
DATE:
SCALE:

4th of JULY CREEK
SEWARD, ALASKA
FIGURE VII-1

SHEET

CHAPTER VIII

TRANSPORTATION

The Fourth of July Creek area can potentially be served by each basic form of transportation: land, water and air. This chapter will discuss each means of transportation as it relates to the site.

LAND TRANSPORTATION

Seward is presently connected by land to the rest of Alaska by the Seward Highway and the Alaska Railroad. Presently usable land access is unavailable to the Fourth of July Creek valley. There are several options available for providing land vehicle access. Two potential access road alignments have been developed and will be discussed. One generally follows the shoreline of Resurrection Bay while the other route climbs the mountain slope to provide access to the "bench" as well as the valley. Seward is served by the railroad and this could be extended to Fourth of July Creek.

Ferry service from Seward is another possible means of access and this too will be evaluated.

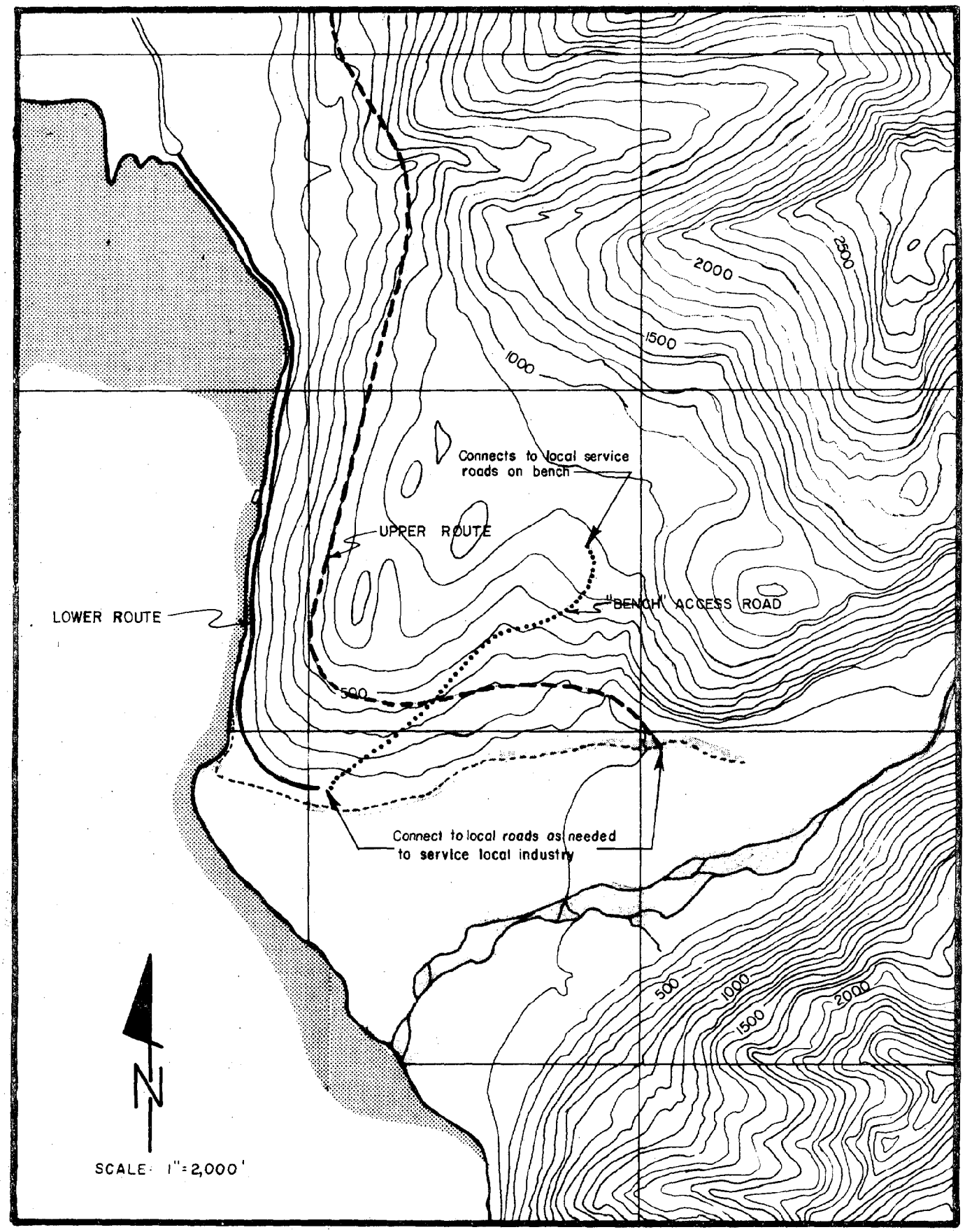
Road - Lower Route

The lower road access route leaves the platted roadway (Nash Road) approximately 150 feet from the shore of Resurrection Bay. It crosses 600 feet of private property where no easement or R.O.W. now exists. The route then generally follows the shoreline for 3000 feet across another tract of private land. The roadway here lies in a private easement granted by a court judgement in 1967. The easement is still valid and is 50 feet wide. Provisions of the judgement allow the easement to be transferred without consent of the grantor.

From there, the route crosses state selected (and tentatively approved) and State patented lands before crossing another parcel of private land (U.S.S. 3294, Lot 2). This parcel has reserved as part of its patent the right-of-way for roads, roadways, highways, etc. It is on this parcel that the old road ends at a dock.

From the southern boundary of the last private parcel, the route follows the shoreline of Resurrection Bay along USS4828 which has been selected by the State but has not yet been tentatively approved. Near the southern boundary of USS4828 the route gains access to Fourth of July Creek Valley and would connect to local roads. See Figure VIII-1 for the road alignment. Final alignment would be decided by field investigation and economics.

Where the route lies on State patented and State selected land with tentative approval, the Alaska Division of Lands can issue a R.O.W. for a roadway. The Kenai Penninsula Borough must write a letter of non-objection for the portion of Borough selected land. The B.L.M. must issue the R.O.W. for State selected land without



ACCESS ROAD ALIGNMENTS

FIGURE VIII-1

tenative approval, but letters of non-objection would be required from the State, the Kenai Peninsula Borough, and the City of Seward.

The route extends approximately 2 miles beyond the end of the platted Nash Road before gaining access to Fourth of July Creek valley. Approximately half this distance is beyond the end of the old road to the dock. The entire route would require a large amount of blasting and fill to create a 40 foot roadway.

Recent work by the Corps of Engineers lists a "Coastal High Hazard Zone" as land below the 10 to 12 foot elevation contour in a nearby area. This zone is subject to wind driven wave action. Final alignment should place the roadbed above this level.

This access route has the disadvantage of crossing several tracts of private land. The existing easement across one private parcel can be transferred and Lot 2 of USS 3294 has a reserved R.O.W. that can be exercised. The right-of-way across the first private parcel, however, must either be negotiated or obtained by the City of Seward through exercise of its right of eminent domain.

Road - Upper Route

The alternate access route leaves Nash Road about 1500 feet before its end and crosses state patented land while climbing to about 350 foot elevation. At this point the route crosses into Forest Service land. The route "side-hills" up the west slope of the mountain for a mile and a half where access to the "bench" is achieved. At this point the route is on state selected land which has received tentative approval. From here the route begins to descend and enters USS 4828 which has been selected by the state but has not yet received tentative approval. The route reaches the valley floor about 1 1/2 miles inland from the shore of Resurrection Bay on state selected and tentatively approved land. See Figure VIII-1 for the approximate alignment of this route.

The alignment of this route can be varied to change the access to the "bench" and to alter the grade. An alignment with nothing steeper than a 6% grade is possible, but other alignments with grades to 8% provide better access to the bench. The final alignment, even if the route at 6% grade is chosen, would probably

require at least some sections of road with 8% grades. The State Highway Department uses 10% as maximum grade. The Seward Highway uses 8% grades in the climb to Turnagain Pass, thus indicating that 6 to 8% grades are still usable by commercial freight traffic, although not ideal.

This route requires approximately 4 miles of new road construction. The first mile is on fairly low, level ground, but the remainder of the road is climbing at near maximum grades along the side of fairly steep slopes. The construction will be quite costly with large amounts of blasting and fill required. At least one and possibly more bridges will be required at deep gulches that must be crossed.

The first section of road crosses state patented, borough selected land, with a free use permit for gravel extraction granted to the State Highway Department and with an active timber sale. The Alaska Division of Lands can issue a R.O.W. for a road across this land but will need letters of non-objection from the Kenai Peninsula Borough (because of their selection), Alaska Department of Transportation and Public Facilities (who hold the free use permit) and the individual who holds the timber interest.

Where the route is located on National Forest land a special use permit from the Forest Service will be required. Application for the permit must be made to the U. S. Forest Service who will look at the site and write a report before making a recommendation.

Alaska Division of Lands can issue a R.O.W. for those portions of the route that lie in State selected land that has received tentative approval. Since these lands are also borough selected, a letter of non-objection will be required from the Kenai Peninsula Borough.

The Alaska Division of Lands cannot issue a right-of-way where the route lies in USS 4828 even though this land is State selected because it has not yet received tentative approval. Application will have to be made to BLM and letters of non-objection will be required from the State Division of Lands, Kenai Peninsula Borough and City of Seward.

Road - Ferry System

This system includes a pair of loading ramps, one at the site, and one with access to the existing road system, probably at Seward. The ferry vehicle could be a motor barge or a surface effect craft.

A 1,000 hp. water propelled hover craft with a clear loading deck of 120' x 45' and a 90 ton payload could operate at speeds from 5 to 7 knots. The initial cost of a system like this is about $2.0 million. For operation costs, including all labor, capital ammortization, materials, insurance, etc., a 15-year life cost of more than $18 million is realistic. Cost figures are presented on page 41 . To increase the payload, or speed would require more power, and increase both the initial and the operating cost. This system could operate off of an unimproved beach.

Local Raods

Road requirements in the actual site will be dependent upon the industry developed. In general the soils are satisfactory for building high-use, heavy-duty roads in most areas except close to the beach. That strip of land adjacent to the beach may require some special construction techniques to offset the looser soils and close proximity of groundwater (springs next to beach) in this area, and still produce a heavy-duty type roadway. Such techniques are underdrains, filter fabric, subgrade removal and replacement, etc. can be used to provide a satisfactory road in these conditions.

Although it is difficult to attain the upper "bench" with a roadway ideal for continuous travel, especially with vehicles loaded and transporting products between the Fourth of July Creek Valley and the Alaska Highway System, an access road, designed and built separate from the main road to the valley with a steeper slope than that acceptable for normal roadways could be constructed to provide construction and maintenance access to the "bench". An accessway initiating near the beach and climbing towards the northeast can attain the bench in about 7000 feet of travel. This provides an accessway with a slope of 10% - 12% with only one major turn, and that at the top of the slope. The "bench" access road is shown in Figure VIII-1.

This accessway could be put in with a 24 ft. total width for $600,000 to $650,000 dollars. It may be possible to reduce this figure somewhat by picking an alignment that will reduce this total amount of rock blasting required to provide a roadway.

Cost Estimates

Cost estimates are based on access roads being constructed as shown in the road sections on Figure VIII-2.

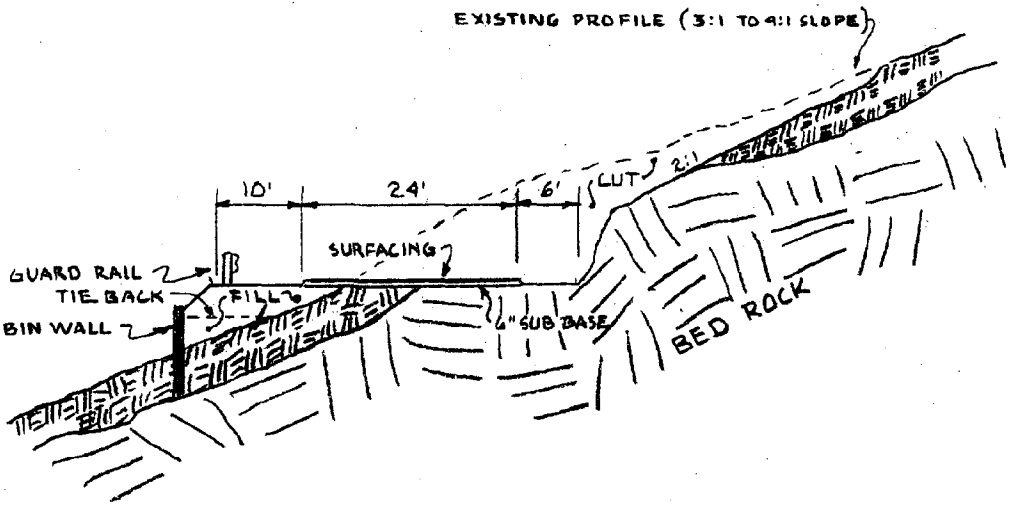
Road-Lower Route		Road-Upper Route	
Excavation	$1,600,000	Excavation	$2,600,000
Fill, Etc.	540,000	Fill, Etc.	360,000
Guardrail, Culverts, Etc.	180,000	Bridges	720,000
Mob, Room & Board, Profit	600,000	Guardrail, Culverts, Etc.	300,000
Total	$2,920,000	Total	$4,580,000
Add for Paving	450,000	Add for Paving	700,000

Ferry - Road System

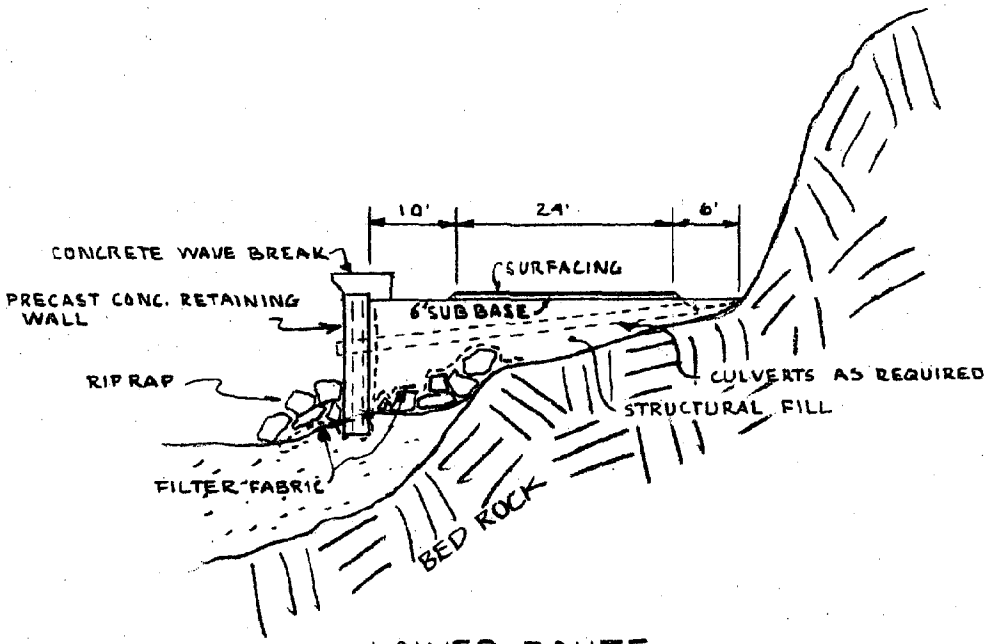
Initial Cost*	$1.6-$2.0 Million
Operation & Amortization Cost**	$5500yDay
Present Worth, 15 Yr. Life, 7% Int.	$18.4 Million

*Estimate by Tiger Equipment Co., Chicago, Illinois.

**Based on updated costs of previous Alaska based operations per telephone conversation 3/2/79 with Tiger Equipment Co., Chicago, Illinois.



UPPER ROUTE



LOWER ROUTE

			Arctic Environmental Engineers, Anchorage, Alaska		
			PROJECT NO. 78 011 01 SFJ DRAWN: WRW CHECKED: D.R.W. DATE: 2-79 SCALE: NONE	TYPICAL ROAD SECTIONS FIGURE VIII-2	
REVISION	DATE	BY			SHEET

RAILWAYS

Seward's position as the southern terminus of the Alaska Railroad can be a distinct advantage to any development in the Fourth of July Creek area. "The existing railroad is in excellent condition for traffic anticipated and no major investment or upgrading would be required for increased usage."[1] The mainline tract is laid with 115# rail and the roadbed is capable of increased tonnage. Increasing usage will require additional maintenance but this should be possible without any service interruption.

Rail service to the Fourth of July Creek area can be connected to the existing facilities by providing mainline track into the site or by constructing a rail-barge facility. A rail-barge facility at the site would connect the area with facilities along the west coast and also with the railhead at Seward if a companion facility was constructed there. This could serve as an alternate to a main-line tract extension.

Rail-barge facilities can be as complex as the 8 track, ramped facility in Whittier or as simple as a grid on which the barge sits at low tide such as the facility at Valdez. Anticipated freight volumes and direction of movement would dictate the choice between a spur connection to the main line or a rail-barge facility as well as the complexity of any potential dock facility.

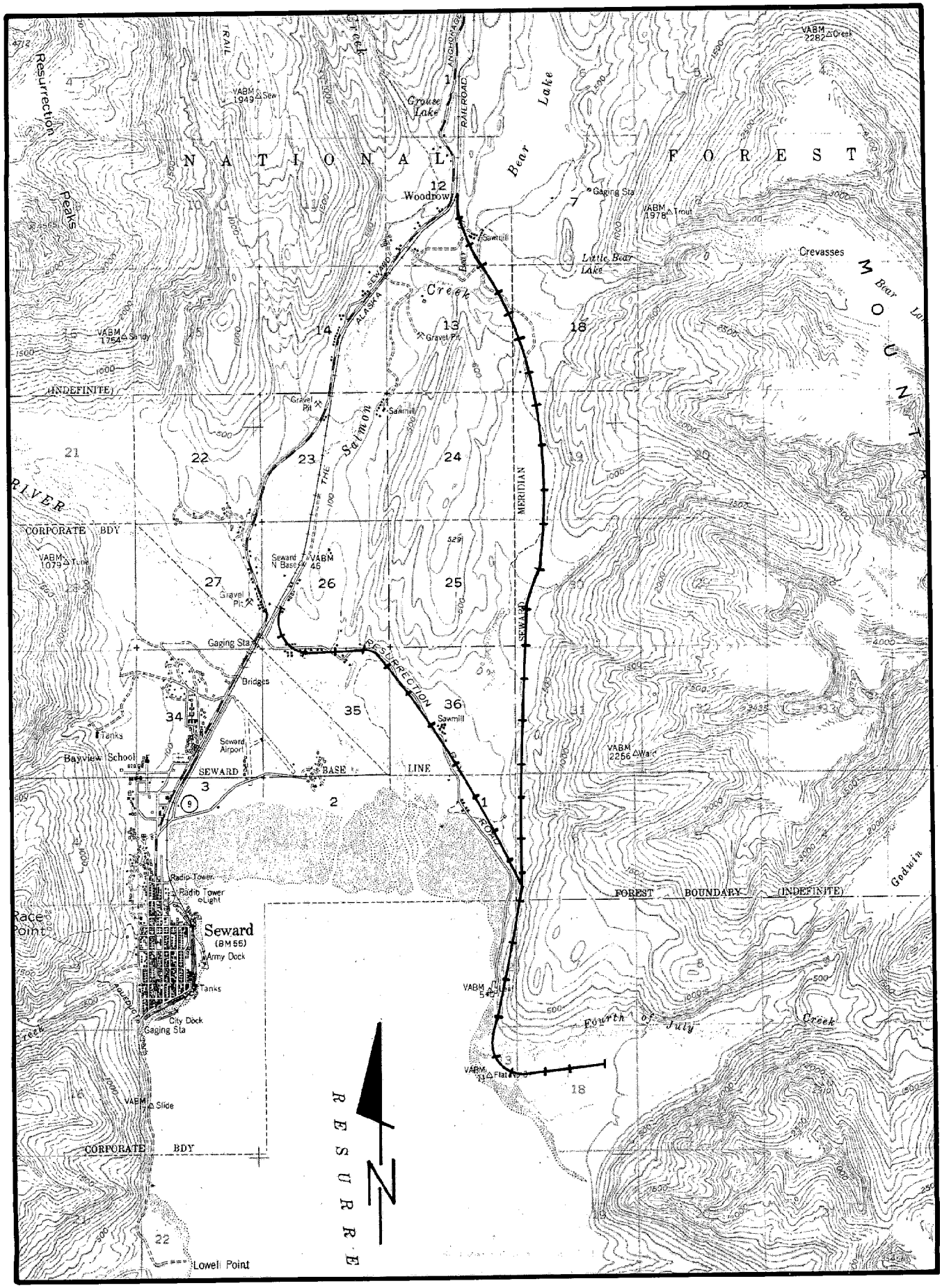
Mainline Connection

Overland rail access to the Fourth of July Creek area is possible with an alignment either along the existing Nash Road and continuing along the shoreline of Resurrection Bay or by departing the main-line approximately seven miles north of Seward and generally following the Seward Meridian to the Bay and continuing along the shoreline to the site. Maximum grades can be kept below 2% in either alignment. Access to the upper bench is not possible using standard rail systems. Figure VIII-3 shows the two possible alignments.

The route following Nash Road will require the purchase of a large amount of residentially developed private land for right-of-way but is approximately 2.5 miles shorter than the alternate route. The Seward Meridian alignment crosses less private land through which rights-of-way must be obtained. This route, however, is located in the Chugach National Forest and some of the lands it crosses are State selected and/or selected by Native groups under the Alaska Native Claims Settlement Act.

The spur from the mainline must be constructed to Alaska Railroad standards and would have the same capacity as the mainline track. Alignment of the spur is not as critical as the economics. Both alignments present similar difficulties and either route will cost between $7 and $12 million.

[1] Condition of railroad as indicated by the Assistant to the General Manager of the Alaska Railroad.



POSSIBLE RAILROAD ACCESS ALIGNMENTS - FIGURE VIII-3

Rail-Barge Facility

The existing rail-barge facility at Whittier has two slips and ramps and can handle up to four hydro-train barges per day with about 55 cars (at 80 tons each) per barge. A facility of this type will cost between $6 to $7 million to construct and will allow interchange of rail cars between the site and the remainder of the West Coast. This type of facility is shown in Figure VIII-4.

A rail-barge facility such as the one in Valdez can unload only at low tide with the barge resting on a grid to align its rails with the dock. Approximately 12 to 14 cars can be unloaded during a low tide at a facility like this. A simple rail-barge facility of this type can be constructed for about $2 million.

A rail-barge facility at the site could be used in a number of ways. Simple facilities could be constructed at Seward and at Fourth of July Creek to provide a quick, relatively inexpensive connection to the existing rail system. A more complex facility would connect Fourth of July Creek to the mainline through Whittier and also to rail-barge facilities all along the west coast. Either type of rail-barge facility would supplement a mainline connection if both were constructed.

Local Trackage

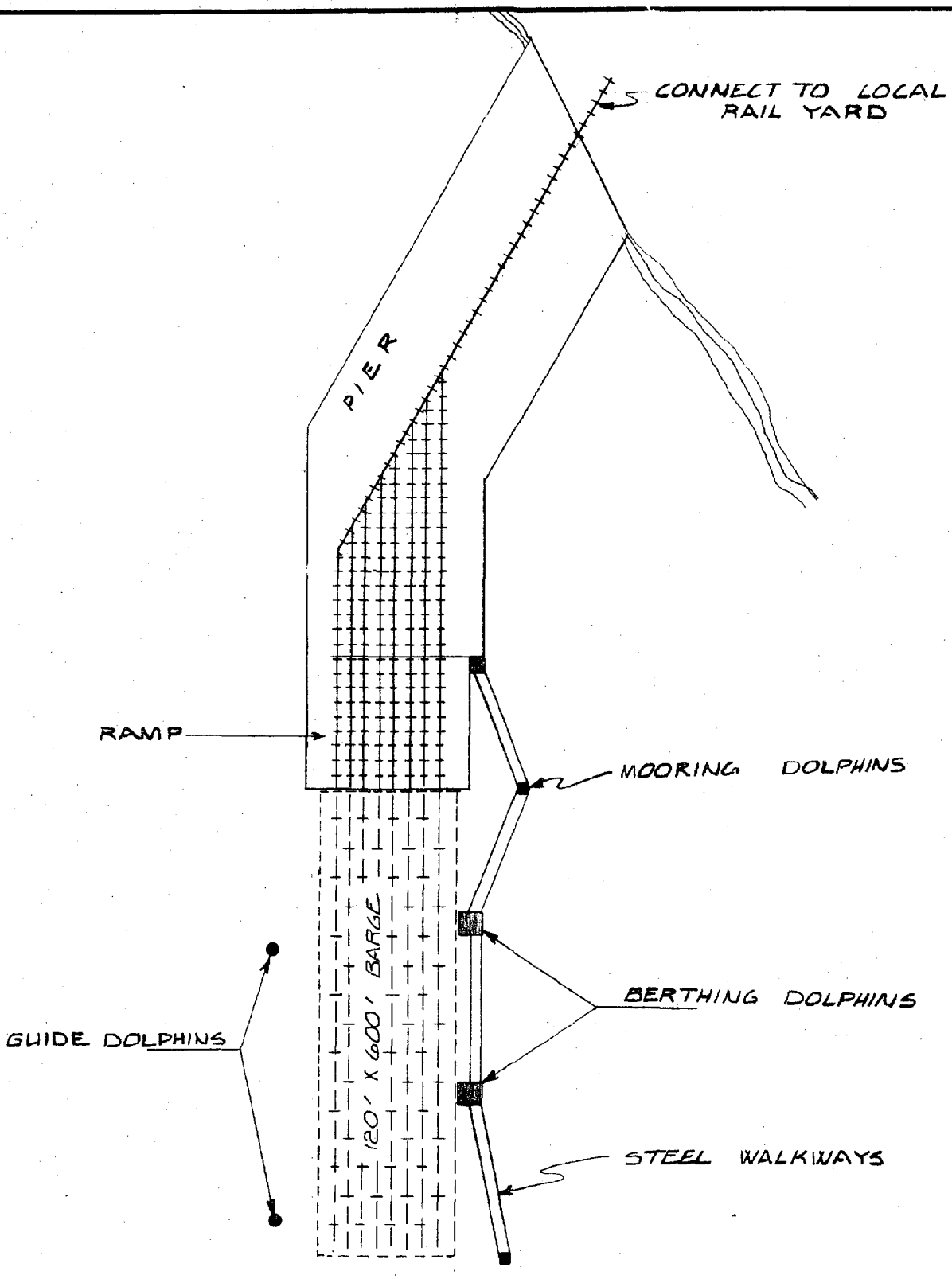
A spur from the mainline or a rail-barge facility could provide rail access to Fourth of July Creek, but additional trackage at the site will be necessary. The additional trackage could take the form of a network of rails connecting several sidings at different industries, or it could be a single rail yard.

The Alaska Railroad requires certain minimum conditions be met for any local trackage they will be using. To have the capability of handling any type of freight movement, the ARR suggests using 90# rail. Soils in general are very good and very little subgrade will probably be required above the mouth of Fourth of July Creek. Near the beach, however, unconsolidated sand and fresh water springs exist. A two or three foot subgrade will probably be required there.

Depending on the local trackage complexity, costs can be anywhere from $0.8 to $3.2 million.

Discussion

The utilization of rail transport for industrial development and operation is very advantageous for equipment transport and bulk freight movement. Large pieces of equipment and machinery does not usually have to be stripped for shipment as it does with road transport. For bulk freight movement there are three distinct advantages to rail transport: 1) The economy of unit train movements; 2) Capacity for large volume transport; and 3) Capability for connection with the rest of the U.S. through a rail barge facility. Rail transport provides multiple commodity use as opposed to pipelines or



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Arctic Environmental Engineers
Anchorage, Alaska

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DATE: 3-79
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RAIL BARGE FACILITY
FOURTH OF JULY CREEK
FIGURE VIII - 4

SHEET

or similar bulk transport methods. Transport by rail reduces highway loads and thus reduces highway maintenance and possibly allows lower construction costs for the highway access road.

Rail transport also has several disadvantages that must be considered. The existing rail corridor has limited access within the State as present. Freight deliveries by rail produce surges that must be handled as compared to a steady flow that would be delivered from a pipeline. Railroad accesses will cost more than highway access and rail transport is less flexible than trucking. Additionally, rail transport cannot serve the upper bench area.

Railroad access could be built by the Federal Government and would require a congressional appropriation. To receive a congressional appropriation, the proposed rail facility must show the ability to produce sufficient rail revenue to repay the investment within a reasonable period. Private industry could also finance the rail facilities. This could be done either by private construction or by the Alaska Railroad with private financing. The capital investment arrangements can be flexible to allow for maximum incentives.

Cost Estimates

Mainline Connection

From Bear Lake 7 Mi @ $1.7 Million/Mi	=	$12,000,000
Along Nash Road 4.5 Mi @ $1.7 Million/Mi	=	$ 7,500,000

Rail Barge Facility

Complex "Whittier" type facility Lump Sum	=	$ 6,500,000
Simple "Valdez" type facility Lump Sum	=	$ 2,500,000

Local Trackage

Single Rail Yard Lump Sum	=	$ 750,000
Rail Network	=	$ 1,700,000
Two Rail Yards	=	$ 1,500,000
		$ 3,200,000

WATER TRANSPORTATION

Prior to the 1964 earthquake Seward was the main seaport servicing most of central Alaska. Since then other communities have built sea-port facilities, and many of Seward's facilities were not rebuilt

after being destroyed by the earthquake. Today, Seward acts as a port mainly for cargo consisting of uncontainerized equipment being consigned to the Alaska Railroad, fishing boats off loading catch and taking on supplies at "Seward Fisheries", and the Alaska Marine Highway System's ferry "Tustemena".

Water transportation at Fourth of July Creek can take numerous forms. Materials can either be shipped into or out of the site and the vessels being used could be freighters, tankers, barges, ore carriers or various other craft. Some materials could be loaded across the existing dock facilities at Seward or port facilities could be constructed at the Fourth of July site. If the existing Seward facilities are used, the materials must be moved between Seward and the site using other transportation means. This section of the report considers only port facilities at Fourth of July Creek.

Port facilities can be broken down into type of industry being served or type of material being handled. To remain as flexible as possible, this report considers four types of cargo, one of which nearly any material could be fit into. The four categories that will be discussed are: bulk material, general cargo, containerized cargo, and fishing vessels.

Bulk Material Movements

There are two methods that bulk materials may be economically transported by sea to or from the Fourth of July Creek area. The first involves the railroad and the other is a bulk freighter or tanker dock.

Bulk solids or liquids can be economically moved by sea via rail-barge. This can be accomplished by interfacing the industry site with the rail-head in Seward or by constructing a rail barge facility at Fourth of July Creek, with a local rail yard servicing the industry. Rail-barge facilities were discussed previously in the Land Transportation sub-chapter.

The other method involves construction of a marine terminal consisting of an accessway, a loading platform, two bresting dolphins and four mooring dolphins. The facility could be similar to the Cherry Point, Washington Terminal but with a shorter access run. A method of material transport between the sea vessel and the industrial stockpile would also be required. This could be a pipeline or conveyor as discussed in the miscellaneous land transportation systems. The physical location of the Fourth of July Creek area makes it possible for a terminal to have a berth parallel to the shore thus allowing the vessel to position with its bow or stern into the wind and prevailing seas. Figure VIII-5 shows a possible plan and construction details of such a terminal.

General Cargo Movements

Presently almost all cargo movement through Seward is handled by the A.R.R. dock at the head of Resurrection Bay. Due to the existance of docks in Anchorage and Whittier that are designed for containerized cargo, and the closer proximity of these ports to the majority of the users. The Alaska Railroad dock in Seward is seldom used for containerized cargo. The majority of cargo crossing this dock is equipment, palletized materials, and materials such as steel shapes, plates, pipe, etc.

General cargo movement in and out of the Fourth of July area could use the existing facilities at Seward, a rail-barge facility as previously discussed or a general cargo dock could be constructed at the site. A general cargo dock would need to be able to handle the berthing forces of large-medium size freighters, heavy wheel or train loads, and a superimposed load of at least 300-400 PSF. A possible dock plan is shown in Figure VIII-6.

Containerized Cargo

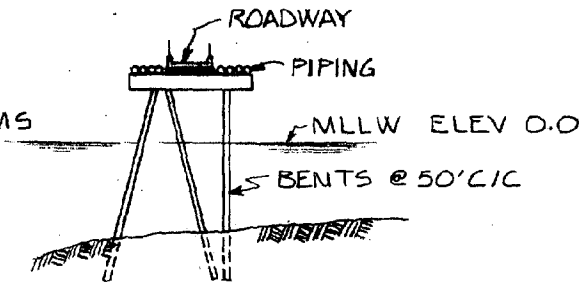
Because specialized facilities for containerized cargo exist in Anchorage (truck based) and Whittier (rail car), movement of containerized cargo could be railed to and from Whittier or could be trucked to and from Anchorage. A more reasonable method for moving large amounts of containerized freight related to an industry at Fourth of July Creek would be to provide a dock capable of handling and interfacing between the industry and the vessel with yard type truck or rail movement. A containerized dock is shown in Figure VIII-7.

Fishing Vessel and Small Craft Movements

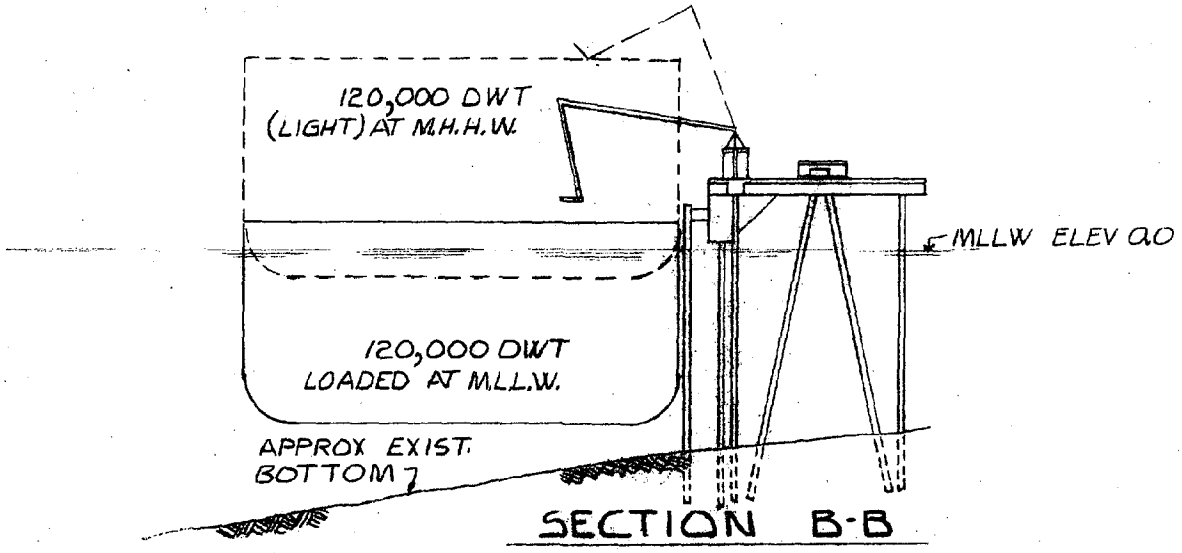
Fishing vessels generally transport their catch from the fishing grounds to the nearest or highest paying processor or buyer. To handle this movement, a processing plant located in the Fourth of July Creek area would need a direct interface between the vessels and the processing plant. Fishing vessels also require an interface between the vessel and supply services to re-supply for each fishing trip. Small craft generally used for commercial fishing or recreation often require some sort of weather protection for "home berthing" and supply.

The fishing vessel-processing plant interface is best handled by a wharf inside a protected harbor with the fish processing plant located on the wharf or adjacent to it. Fishing vessels 50 to 150 ft. long can use a wharf without protection if it provides for north-south orientation of the long axis of the vessel. Smaller vessels require a protected harbor for off-loading and refitting.

NOTE: CONVEYOR SYSTEMS OR SLURRY PIPES REPLACE LIQUID LOADING SYSTEMS SHOWN FOR BULK SOLIDS TRANSFER SYSTEMS



SECTION A-A



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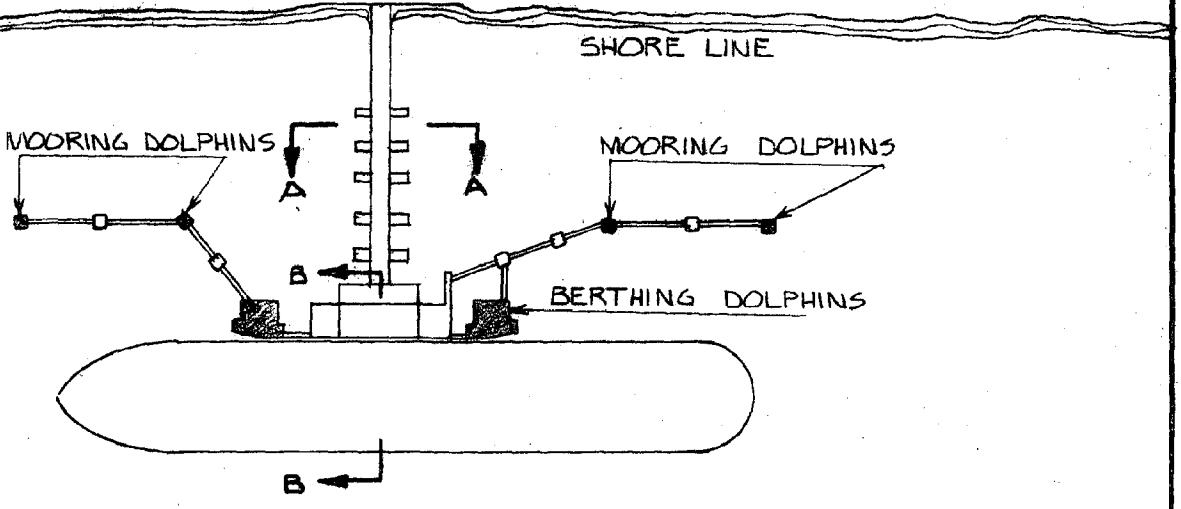

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Anchorage, Alaska

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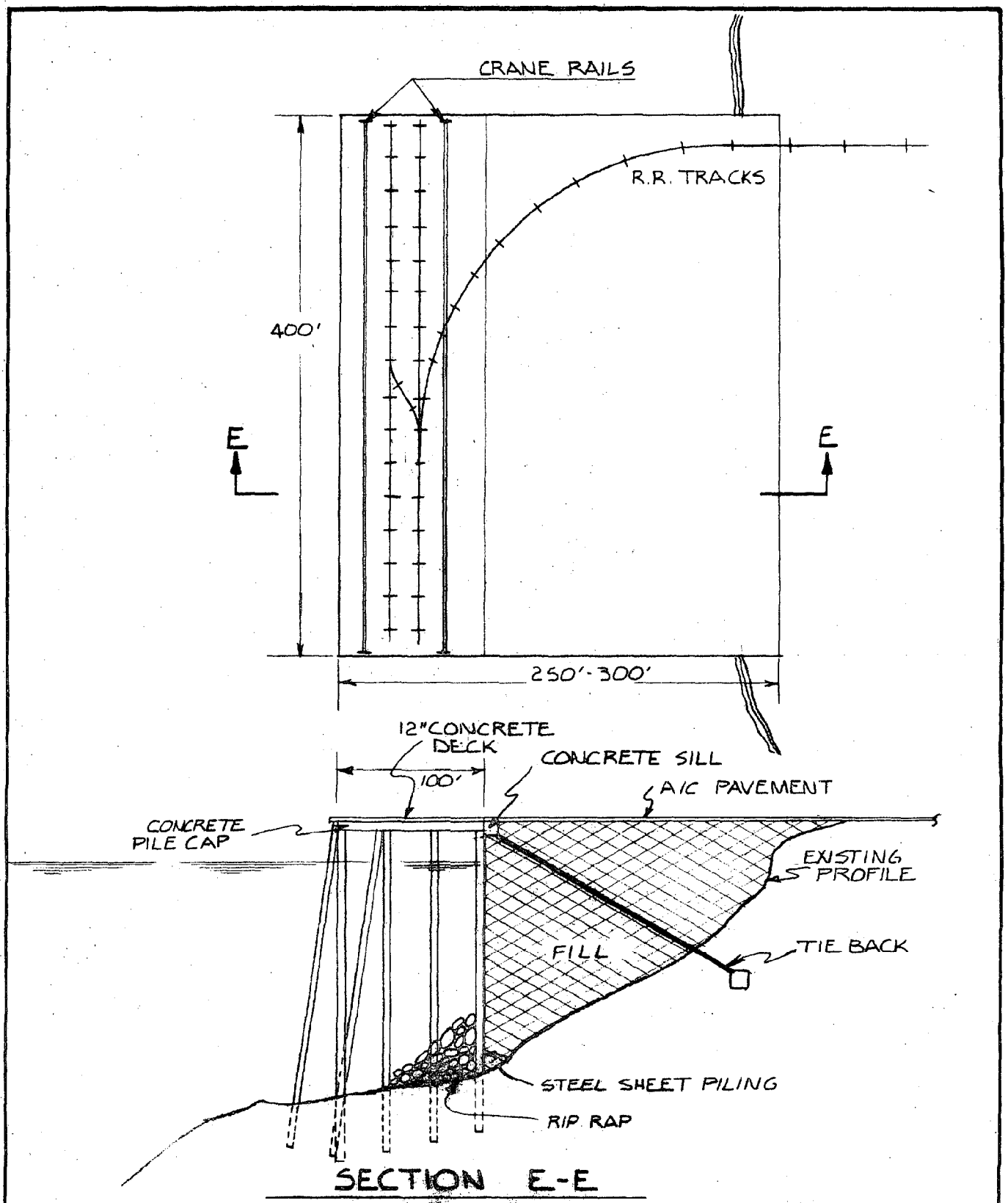
SCALE: NONE

BULK LOADING ~TERMINAL~

FOURTH OF JULY CREEK

FIGURE VIII-5

SHEET



SECTION E-E

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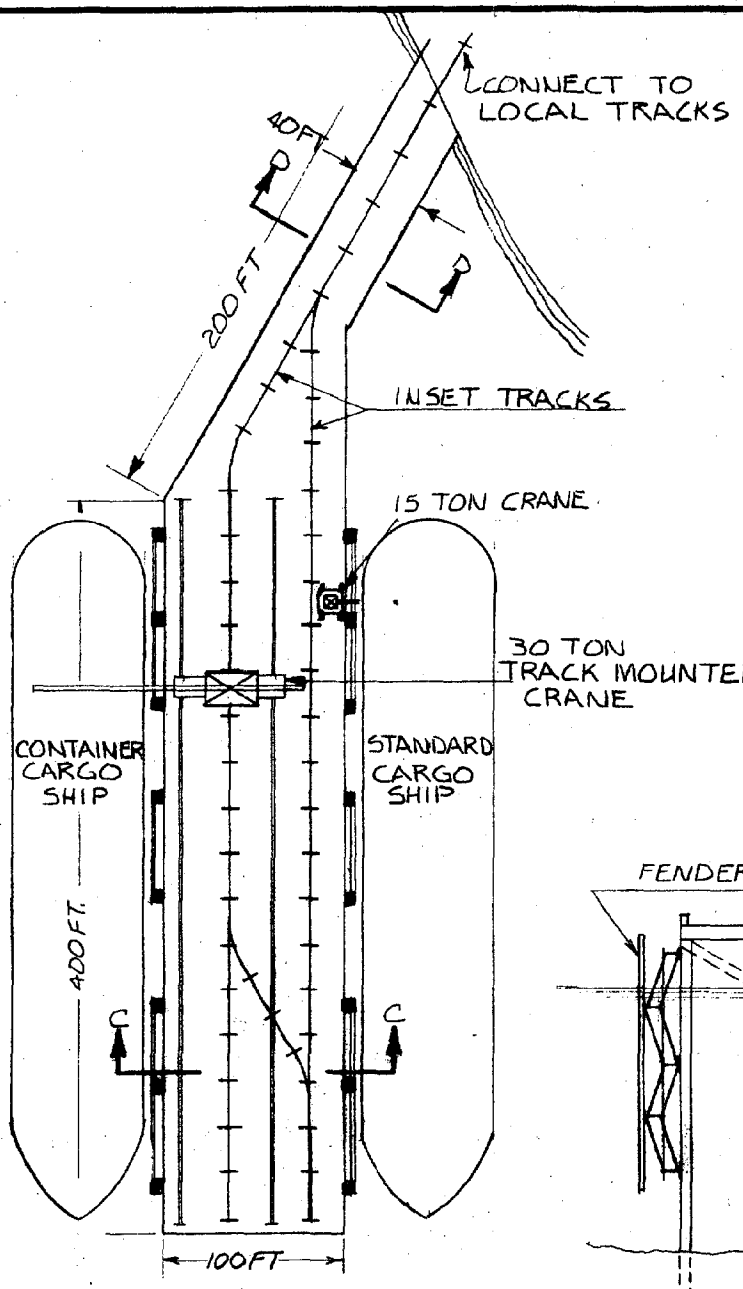
SCALE:	NONE

STANDARD CARGO DOCK

FOURTH OF JULY CREEK

FIGURE VIII-6 SHEET



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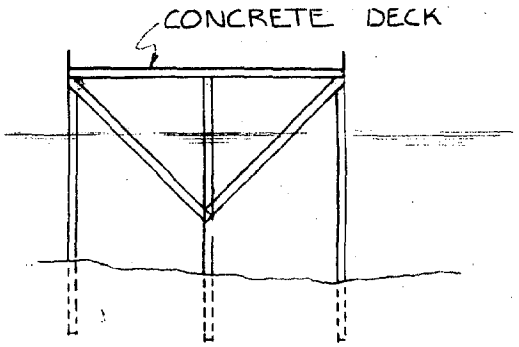

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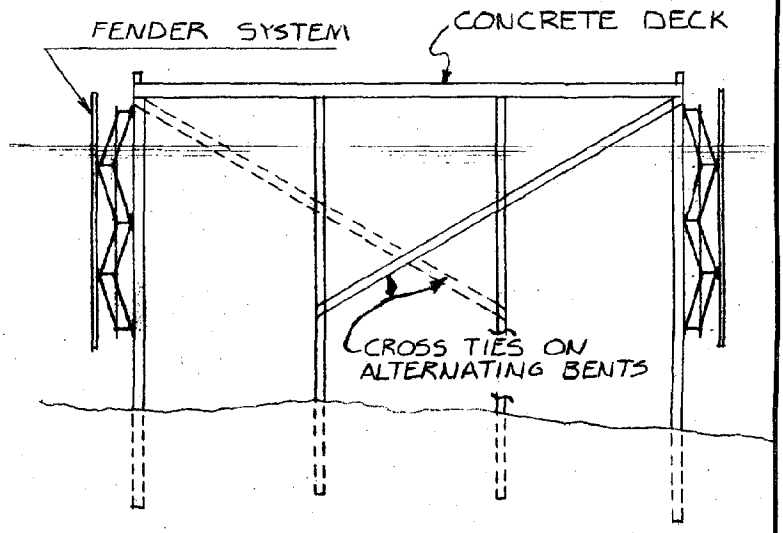

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CONTAINER SYSTEM DOCK

FOURTH OF JULY CREEK

FIGURE VIII-7

SHEET

A processing plant that served only larger vessels could supply adequate protection by constructing a rubble-mound breakwater adjacent to a marginal wharf. This would be the minimum development required for the fish processing industry. To serve all types of vessels that could be employed in the bottom fish industry a small boat harbor would be required.

A small boat harbor could be constructed either by dredging and constructing rubble-mound breakwaters off the Fourth of July Creek fan, in conjunction with the fisheries wharf, or by dredging the beach area and constructing a breakwater at the present shoreline. The two possibilities are shown in Figure VIII-8.

Cost Estimates

The following estimates are for actual construction only. They do not include design, surveying, ancillary equipment or structures, or cost of obtaining Corps of Engineers and similar permits.

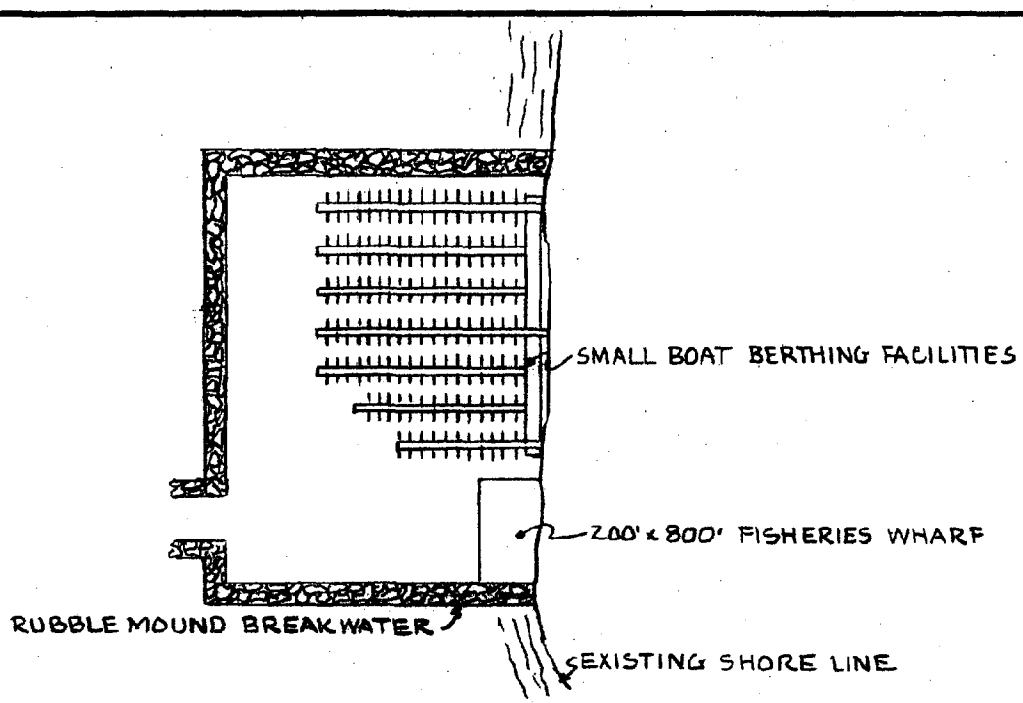
Bulk Material Terminal

Mooring Dolphins @ $170,000/ea.	$680,000
Berthing Dolphins @ $280,000/ea.	$560,000
Fender System @ $900/ft.	$135,000
Dock & Approach Area @ $90/ sq. ft.	$1,800,000
Walkways $115/ft.	80,000
Structural	3,600,000
Electrical	300,000
Mechanical*	1.5-3 Million
Total	$5.06 - 6.56 Million

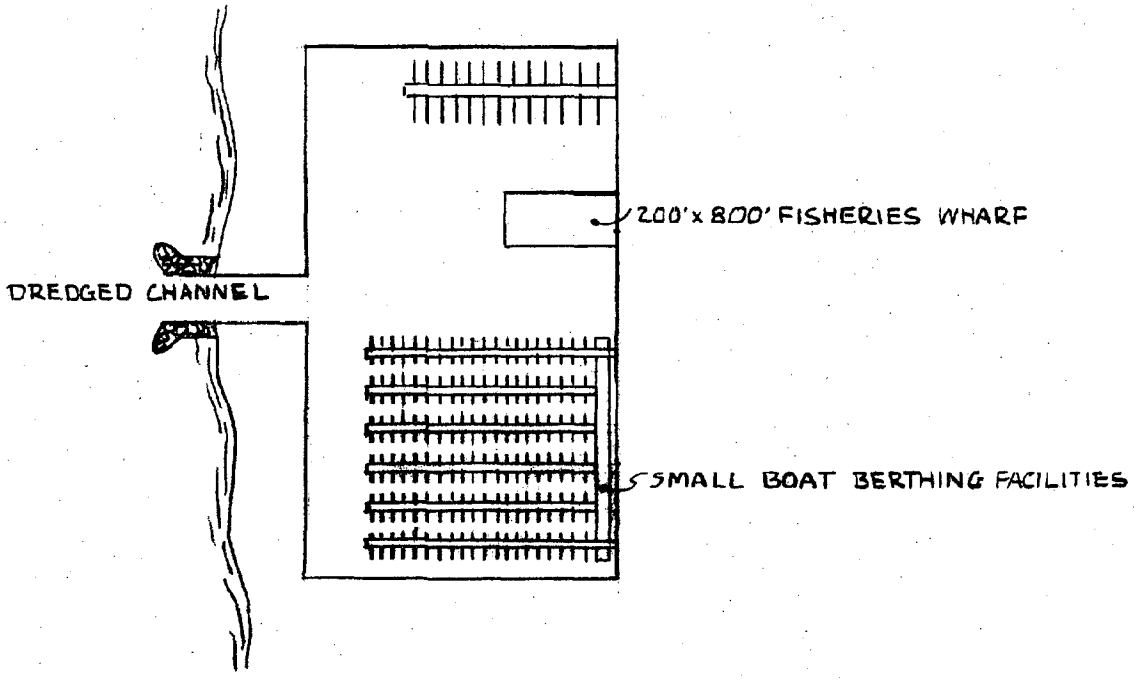
*Depending on Systems required.

Rail-Barge Facility

Pier (150' x 200') @ $110/sq. ft.	$3,300,000
Ramp (150' x 100') @ $70/sq. ft.	$1,050,000
Berthing Dolphins 2 ea @ $280,000	$ 560,000
Mooring Dolphins 2 ea @ $170,000	$ 340,000
Guide Dolphins 2 ea @ $90,000	$ 180,000



BREAKWATER CONSTRUCTION HARBOR



DREDGED CONSTRUCTION HARBOR

			Arctic Environmental Engineers, Anchorage, Alaska	
			PROJECT NO. DRAWN: WRW CHECKED: FKV DPW DATE: 3/79 SCALE: NONE	FISHERIES WHARF AND SMALL BOAT HARBOR FIGURE VIII-8 SHEET
REVISION	DATE	BY		

Electrical	300,000
Mechanical	400,000
Trackage @ 25,000/switch = $300/ft.	700,000
Total	$6.3 Million

Container System Dock

Dock & Access Way, 48,000/sq.ft. @ $160/sq ft -	$5,280,000
Fender Systems, 600 ft. @ $900/ft. -	$ 540,000
Electrical	600,000
Mechanical	600,000
"Portainer" Container Crane	1,500,000
Total	$8.52 Million

Standard Cargo Dock

Dock, 40,000 sq. ft. @ $85/sq. ft. -	$3,400,000
Fender System, 400 ft. @ $900/ft. -	360,000
Steel sheet piling, 650 ft. @ $1,200/lin.ft.	780,000
Fill, 35,000 yd. @ $2.50/yd. -	87,500
Rip-rap, 2,000 Ton @ $12/Ton	24,000
Electrical	200,000
Mechanical	400,000
Total	$5.25 Million

Fishery Wharf (Breakwater Construction)

Breakwater 1300' @ $5000/ft.	$6,500,000
Wharf 300' x 200' @ $20/sq. ft.	1,200,000
Walkway 500' @ $150/ft.	75,000
Pile Bents 30 @ $2000 ea.	60,000
Dredging 45,000 w/yard. @ $1.50	67,500
Mechanical & Electrical	400,000
Subtotal (Fishery Wharf Only)	$8,302,500
Add for small boat harbor:	
Breakwater 2300' @ $5,000/ft.	11,500,000
Dredging 270,000 w/yd. @ $1.50	405,000
Total (Fishery Wharf & Small Boat Harbor)	$20,207,500

Small Boat Harbor with Fishery (Dredged Construction)

Dredging 2,750,000 w/yd. @ $1.50	4,125,000
Jetty 1000 ft. @ $2000/ft.	2,000,000
Wharf 2000' x 800' @ $20/sq. ft.	3,200,000
Walkway 5,000 ft. @ $150/ft.	750,000
Pile Bents 250 @ $2000 ea.	500,000
Mechanical & Electrical	400,000
Total	10,975,000

AIR TRANSPORTATION

Perishable and other materials requiring fast transport must use air transport from Seward to anywhere beyond the Kenai Penninsula. Air transport can utilize the Anchorage or Kenai airports with truck connection from Seward, or the existing airport at Seward can be utilized. Use of the Seward airport does have some limitations due to runway length and airport facilities. An air connection directly to the Fourth of July Creek industrial site is not feasible due to the topography of the area.

Large cargo craft such as the Hercules L-100 can operate off the Seward airport with load restrictions. To obtain full cargo load service the main landing strip would need to be extended to at least 5,000 feet. Smaller cargo craft such as the SHORTS or the Caribou are capable of using the existing primary strip when fully loaded. These aircraft are suited for short-haul flights to Anchorage. Aircraft that can operate with long range capacity and sufficient cargo capacity require a runway length of 5,500 to 6,000 feet. To extend the existing runway to this length would be expensive because of the large amount of tideland that must be filled.

Presently the approach to the Seward airport is limited by Visual Flight Rules (V.F.R.) operation. Adding navigation aids to provide an instrument approach directly to the airport would be of little aid since the minimum decision attitude would be between 4,000 and 5,000 feet. Present facilities allow an instrument approach to the Kenai airport with an additional 40 miles of V.F.R. flying to reach Seward. A navigation aid could be placed near the mouth of Resurrection Bay to allow an area approach with a probable minimum attitude of 2,000 feet. The remaining 20 mile flight into Seward would be a V.F.R. approach. Federal Aid programs are available for such navigational aids, but indications are that Seward does not warrant such a system.

CHAPTER IX

UTILITIES

ELECTRICITY

Electric power for an industrial park at Fourth of July Creek can be obtained from existing substation facilities or by installing on-site power generation facilities.

The City of Seward obtains the majority of its power from Chugach Electric Association. The City is presently operating near the capacity of the system, however, improvements scheduled for construction during the Fall of 1979 will provide additional capacity. The improved system will be able to handle some load from an industrial development at Fourth of July Creek. A maximum allowable load of 1500 KVA should be assumed until further improvements are made. Additional improvements could increase the capacity to approximately 5000 KVA, depending on community growth and other industrial demands.

Electric power from the existing substations can be transmitted to Fourth of July Creek in two ways. A 12.5 KV distribution line could be installed from the new substation to the valley or a 69 KV transmission line with a new 69/12.5 KV substation at the site could be installed. Additional diesel power generation could be provided for emergency back up power.

Power requirements could be met at the site by installing an on-site diesel generation plant. With the exception of power intensive industry, a 2500 KW plant would meet the requirements of a small industrial park while a 5000 KW plant would provide emergency back-up as well as handle a larger development or industrial growth.

Large power consumers requiring 5000 KW or greater could be served by on-site power generation utilizing heat recovery to maximize fuel utilization at reasonable power costs. The City of Seward and large power consumers could share investment and operating costs in a cogeneration arrangement to fully utilize electric power and heat recovery.

Costs

12.5 KV Distribution Line	$200,000
69 KV Transmission Line	$400,000
2500 KW On-Site Generation	$1,000,000
5000 KW On-Site Generation	$2,000,000

COMMUNICATIONS

Seward is connected to the rest of Alaska and the world by telephone/telex connections through the RCA Alascom long distance network of hard-wire, microwave and sattelite systems. Local service and connection to the RCA long distance network is provided by the General Telephone Company of Alaska. The General Telephone Company has 26 outgoing and 15 incoming long distance trunk connections to the RCA network. RCA can supply "dedicated-lines" to users in the Seward area for telex, telegraph, or other systems requiring such service. RCA can only supply these services at the RCA terminal in Seward. Connection from the user to the RCA terminal is obtained by purchasing a connecting "pair" from the General Telephone Company.

To obtain service at Fourth of July Creek (local, long distance, or "dedicated line") one of three types of connection to the existing General Telephone Company system must be constructed. The first type would consist of a cable connecting the existing exchange with Fourth of July Creek. The cable would be comprised of "pair" sets: one "pair" for each subscription, user, or "dedicated line". This type of connection would be acceptable for a small to moderate number of users. The second type of connection would consist of a microwave station at the exchange, and a mating microwave station at Fourth of July Creek. This could provide the equivalent of a "pair" for each user, but would probably cost more than a cable connection unless an extremely large amount of "pairs" between Fourth of July Creek and Seward were required. The third type of connection would consist of a small switching system at Fourth of July Creek to which all users (except "dedicated line") would be connected. The switching system would have a moderate amount of connections to the Seward exchanges. This type of system could handle more users in the Fourth of July Creek area at a more economical rate.

The General Telephone Company is not willing to put in any type of connection unless it can be shown that the user charges can produce an acceptable rate-of-return on the capital investment. If the return-rate on the capital is insufficient, the user(s) in the Fourth of July Creek Area would be required to fund the connection link. Any connection funded by the General Telephone Company would be determined (as to type) by the requirements of the users and the most economical method of meeting these requirements.

No telegram services exist in Seward, however, there are existing telegraph and telex users.

FUEL

Two bulk fuel plants are located in Seward: Chevron and Texaco. Each handles gasoline, diesel, propane and related products. Natural gas is not available in the area.

A 22,000 gallon per hour pipeline is available for fueling large vessels at the end of the Alaska Railroad dock. The fishing fleet is supplied by tank trucks at the small boat harbor.

The Chevron distributor receives his fuel by tanker from Valdez and Nikiski (Kenai) while Texaco is supplied from Anchorage via rail car.

Development at Fourth of July Creek could rely on the existing suppliers if the fuel usage of the industry was within the capacity of these suppliers. Alternately, a bulk fuel plant could be located at the site. Fuel deliveries to Fourth of July Creek could take several forms; truck delivery from Seward, pipeline from Seward, railcar from Anchorage or ship from Valdez, Nikiski or the contiguous United States. A fuel pipeline to the site would cost in the neighborhood of one million dollars. Costs for a tanker terminal are covered in transportation chapter.

WATER

There are two sources of freshwater in the Fourth of July Creek area. Surface water is available from Fourth of July Creek, and groundwater is available from the valley alluvium. Surface water flows range from 110 cfs (recorded during October, the month with the most rainfall) to 15 cfs (recorded during October, the month with with the least rainfall). Continuous use of surface water will not be allowed as Fourth of July Creek is a salmon spawning stream and the Alaska Department of Fish and Game will not allow any withdrawals from, or work in the stream during critical periods. Groundwater in the valley alluvium is fed by surface runoff from the mountain slopes and influent from Fourth of July Creek as it crosses the delta fan. The derivation of a crude estimate of groundwater flow during the fall is included in the appendix. From this it can be estimated that a properly designed well field system could continuously draw 6 to 10 million gallons a day. The aquifer has the potential of providing a small amount of seasonal storage. Assuming a properly placed and designed well field, this storage capacity may amount to 90 million gallons, without causing salt water intrusion problems. The U.S. Geological Survey will initiate field work on a groundwater study in the Fourth of July Creek Area during July or August of 1979. This study will provide additional data regarding aquifer storage, withdrawal capacity, etc.

Water on the "bench" is only available from stagnant pools of trapped runoff water. The close proximity and tight jointing of bedrock preclude the possibility of obtaining groundwater of good quality or quantity from a well on the bench.

Alluvial groundwater in the Seward area is of high quality, and is very acceptable for normal consumptive uses. It is not expected that groundwater from Fourth of July Creek valley should be qualitatively different.

Groundwater may be obtained from the valley alluvium by pumping from normally developed water wells, "Chicago" type caisson wells or infiltration gallery systems. Well and pump sizing will need to be determined by a study of each industries potential requirements, local storage capacity, possible fire flows, and preferred insurance rating.

Water storage tanks are designed to conform to the specific domestic and/or industrial water needs in the community. Storage tanks are generally sized to provide for surge demands, power outage demands, drout-time demands, and possible fire demands. Storage tanks should be positioned to provide water at an acceptable pressure to all users. The type and construction of a tank depends upon local conditions and preferences. A water reservoir or stand pipe positioned on the side slope of the north side of the valley could provide sufficient pressure to most users in the valley without requiring the supply well pump to pump against an excessive pressure with increasing pumping cost. A booster pump drawing from such a tank could supply water to a high level reservoir, which in turn would provide water for the bench. The water systems for the bench and the valley should be kept separate, because a single system providing an acceptable pressure of 40 psi at the bench would provide a water pressure of about 350 psi in the valley unless a pressure reduction system were provided. Similarly, if a storage tank were only provided to the lower system through a pressure reduction system, a lot of energy and money would be wasted pumping water up to the bench. Water storage reservoir in place in the Seward area can be presently estimated at $0.80 to $1.00 per gallon capacity.

Distribution mains will need to be designed to accommodate peak industrial or fire demands. Fire control purposes require that hydrants and mains be spaced and sized by the fire hazard of the area to be served. This will vary with each occupant. However, certain minimum standards should be met to provide allowances for growth and change without jeopardizing insurance ratings. The City of Seward has a minimum line bury depth of nine feet to prevent the freezing of stagnant water lines.

Minimum size of main lines should be 8" diameter with 6" being the smallest size piping in the grid. Construction of waterlines in the valley could be by conventional methods, however, construction of any pipeline from the valley to, or on the bench will require special design. The soil horizon is very thin over bedrock in most areas on the bench and surrounding slopes. This will preclude deep burial and may require using insulated lines, continually circulating systems, and/or heat tracing. In some places the line may even need to be anchored to the bedrock to prevent soil creep on unstable slopes from pulling the line apart.

Costs

It is impossible to estimate costs for a water system without knowing the demand or requirements on the system, however, some costs, (based on arbitrarily sized components) are presented here to aid in determining the site feasibility.

Supply System

2-12" diameter x 80' wells (about 800 gpm/ea.)

1-control building and chlorination system

Wells, with pumps $50,000/ea.	= $100,000
Wellhead Covers $800.00/well	= 1,600
400' 8" diameter connecting pipe @ $35.00/ft.	= 14,000
Control House, controls, chlorination	= 120,000
Electrical, engineering, contingency	= 64,400
Total	= $300,000

Storage Tank

1/2 Million Gallon Storage Tank

AWWA - Steel - Insulated @ $1.00/gal	= $500,000

Distribution System (Valley Only)

8" line, 200 ft. @ $45/ft (includes valves, hydrants, etc.)	= 90,000
6" line, 2000 ft. @ $40/ft	= 80,000
Subtotal	$170,000
Appx. Total System Cost	$1,000,000

SEWAGE DISPOSAL

The Fourth of July Creek area is well suited to conventional wastewater collection, treatment and disposal techniques. No unusual conditions exist that would require specialized or extremely advanced practices. Resurrection Bay can be used as the receiving water for wastewater effluent and is located adjacent to the site. The types of sewage treatment that can be utilized at Fourth of July Creek are limited by current technology and agency regulations and not by site limitations.

Essentially three basic sources of sewage need to be considered. These are domestic, industrial and fisheries wastes. Domestic wastes can be further broken down into low density industrial complexes or residential development on one hand and the same type of waste but in large quantities on the other.

If the Fourth of July Creek area was developed as low density residential on large lots or a small industrial development produced only human and kitchen wastes, the logical solution to sewage disposal would be on-site systems at each source. The soil conditions are ideal for septic tank systems with leach fields. Sizing, leach field design and system complexity would be dictated by final waste quantity and type.

A larger development producing greater quantities of domestic sewage would require a central sewage treatment facility. A collection system would be required to bring the wastes to the facility. One of the many package treatment plants on the market today would handle a fair sized development easily. Another method of treating this type waste is an aerated lagoon similar to the type the City has selected for Lowell Point. Lagoons are simple to construct and operate and are relatively inexpensive.

Fisheries wastes probably should be handled by a reduction plant. Such a system simply removes most of the solids for land disposal or other uses, grinds the remaining solids very finely and then discharges the result into the receiving water using a deep outfall. Human and kitchen wastes produced at a fishery would be handled by one of the previously discussed means.

Industrial wastes are more complex to treat than domestic or fisheries wastes. The type of treatment best suited to one industry may not be adequate for another. Therefore, industrial wastes can only be evaluated on a case by case basis.

Each industry is usually familiar with its own wastes and difficult or special techniques that may be required. These special facilities are generally built and operated as part of the industries development program. No unusual conditions exist at Fourth of July Creek that would cause these specialized facilities to be substantially different from what would be required elsewhere. The effluent limitations imposed on discharge to Resurrection Bay are not expected to be unusually severe, so the site would offer an advantage over some locations.

The collection system for sewage can be constructed by conventional methods. The valley is gradually sloping towards the bay, so a gravity system with very few lift stations would be possible. Soils in the valley are generally excellent so no specialized construction techniques would be required there. On the bench, however, shallow bedrock will necessitate that sewer lines cannot be buried very deeply, so they should be insulated. This does not offer any significant design or construction problems.

Treated wastewater effluent can be discharged to Resurrection Bay. A deep outfall into Resurrection Bay can be constructed within a short distance from shore. Disinfection will not be required with a deep water outfall in the bay.

Construction costs cannot be estimated with any accuracy until details of waste quantities, strengths, etc. are known. The following figures do provide some indication for development of planning costs.

Collection System

4000 ft. 8" @ $65/ft	$260,000
1 Lift Sta. @ $6000 ea.	6,000
400 ft. 4" @ $50/ft	16,000
	$ 282,000

Lagoon (900 population equivalent)

Earthwork	50,000
Liner & dividers	150,000
Mechanical	30,000
Outfall & control	75,000
Total	$315,000

Septic Tank & Leach Field

For small to moderate industry (approximately 3000 gal/day)	25,000

SOLID WASTE

Domestic solid waste generation (garbage) follows a fairly predictable pattern as far as quantity and type. Household wastes, paper, and kitchen wastes produced from residential development, offices, or dining facilities should aim at using existing disposal facilities. The amount of domestic type waste that would be produced in this area would not be sufficient to economically operate a separate landfill system apart from that system already existing.

Industrial type solid waste falls into many categories. The U. S. Environmental Protection Agency has classified many types of solid waste produced by certain industries as "Hazardous Wastes". These types of waste require that special areas be used and certain procedures be followed for their disposal. Because of the soil system in the Fourth of July area, it is not feasible to dispose of hazardous waste on the site.

Industries that produce large amounts of non-hazardous wastes (slags, ash, etc.) are likely candidates for on-site landfilling. Those wastes which have possibility of generating leachates, contaminating water, becoming putrescible, or are not acceptable for use as clean fill material must be disposed in an acceptable state permitted landfill.

Presently the Kenai Peninsula Borough operates a sanitary landfill in the Seward area. Domestic and similar type wastes may be disposed of there during operating hours. Presently, no refuse collection or carrier service has a Public Utilities Commission permit covering the Fourth of July Creek area as there is no existing road access to the area.

The Kenai Peninsula Borough operates a hazardous waste disposal site near Sterling, Alaska (about 85 miles by road from Seward). Wastes produced in the Fourth of July area that meet the E.P.A. description of "hazardous wastes" would need to be transported to this site for disposal. All use of this site must be coordinated with the Assistant Borough Engineer at the Kenai Peninsula Borough in charge of solid waste management.

Local soils in the Fourth of July area are washed fluvial sands and gravels with little resistance to groundwater or leachate movement. Because of this, any local solid waste landfill, slurry

settling pond, or drying bed, will need to have positive leachate control. This may very likely need to be as extensive as a bentonite clay or asphaltic concrete liner. Specific conditions would be determined by the operating permit issued by the Alaska Department of Environmental Conservation.

Costs for using the Seward Landfill or the Sterling Hazardous Waste Facility are dependent upon yearly operating costs and operating costs for each specific use, respectively. An industry expecting to use either facility extensively should contact the Kenai Penninsula Borough for specific, up-to-date information at the time of use.

Costs for operating and maintaining specialized landfills, etc., are very dependent upon actual operation techniques, construction details and quantities to be disposed of. No estimates of such operations can be attempted without nore specific details.

CHAPTER X

CONCEPTUAL DEVELOPMENT PLANS

There are no site limitations at Fourth of July Creek that preclude development. Nearly any type of industry could locate at the site, but certain industries would be more likely to than others. This chapter presents preliminary development plans for four industries that could reasonably consider locating at Fourth of July Creek. Each of the four plans is for a specific industry but the four examples cover a wide spectrum and any industry can be correlated with one of the four plans.

Expansion of fish processing capabilities in the general Seward area has excellent potential and the anticipated growth in Alaska's bottom fishery will require construction of new facilities. No major shipyards exist in Alaska but a major repair yard is needed. Oil exploration in the Gulf of Alaska and oil and gas production in lower Cook Inlet point up the potential for petrochemical industry growth in the Seward area. Refineries will be needed, Alaska's royalty oil and gas must be processed, and Seward is a potential site for these facilities. As Alaska's mineral resources come to be more fully utilized, transportation and processing facilities in Alaska will be forced to expand and develop. One development plan presented here considers a smelter located at the site. Because of Seward's location on the Gulf of Alaska, a smelter could handle other world sources of raw materials. The fourth development plan considers freight or material handling at the site. Because cargo facilities already exist in Seward, this plan centers on bulk material handling.

The high initial costs of development of the Fourth of July Creek area requires that a major industry be the first to settle there. Smaller industries can locate in the valley, but cannot support the heavy front end costs of development by themselves.

A number of features are common to any development at the Fourth of July Creek site. Any development there will require road access. Two access routes are discussed in the chapter covering transportation, but the lower route along the shoreline is more feasible for each of the development plans presented here. Two of the plans do utilize the "bench" but only for secondary use such as storage. For this type of use the steeper access route discussed in Chapter VIII, Transportation is adequate. The lower route roadway and the "bench" access route can be constructed for less total cost than the upper route roadway.

Each of the industries analyzed will require a wharf or port facility of some type. Because the potential for submarine landslides at the face of Fourth of July Creek fan does exist, port structures are located at the north side of the valley in each of the development plans. The dock is in a better position for connection to rail and highway systems in this location also.

Three of the four development plans include rail service. In each plan the industrial site is assumed to be receiving large enough quantities of material from within Alaska to economically justify an overland mainline track connection.

A rail alignment following the existing Nash Road will interfere with the residential development that has occurred there and has been ruled out for that reason. The development plans presented here show rail service connecting with the main line at Bear Lake, seven miles north of Seward.

Any development in Fourth of July Creek basin is faced with potential flooding by the creek. The creek's braided channel has moved within the basin in the past and could change its course again to threaten development there. The creek's present location splits the valley into two developable areas, one on each side of the creek. Furthermore, the creekbed removes valuable land from development. All of these considerations can be resolved by relocating the creek to the south wall of the valley and constructing a training dike.

The Alaska Department of Fish and Game has tentatively approved the concept of relocating the creek. The requirements that must be met by the relocation project cannot be determined until more specific details of the move are known, but the project should be staged over several years of time. Several deep pools should be constructed aside from the main channel for salmon fry rearing. The deep pools provide a source of gravel for construction of roads and other improvements.

Costs for creek relocation and construction of a training dike are estimated in the following table. The deep pools are not included in the cost as they provide gravel for construction and should pay for themselves.

Creek Relocation Cost	
Rock-filled Gabion	
40,000 @ $45	$1,800,000
Cutting New Channels	100,000
Rip-rap bed protection	
20,000 ton @ $15	300,000
Contingency & Contractor Mark-up	300,000
	$2,500,000

Relocation of the creek is included in each of the four development plans. This is necessary for the protection of the development but also provides the advantages if increasing the developable area and joining what would otherwise be two areas into a single developable tract.

FISHERIES AND SHIPYARD

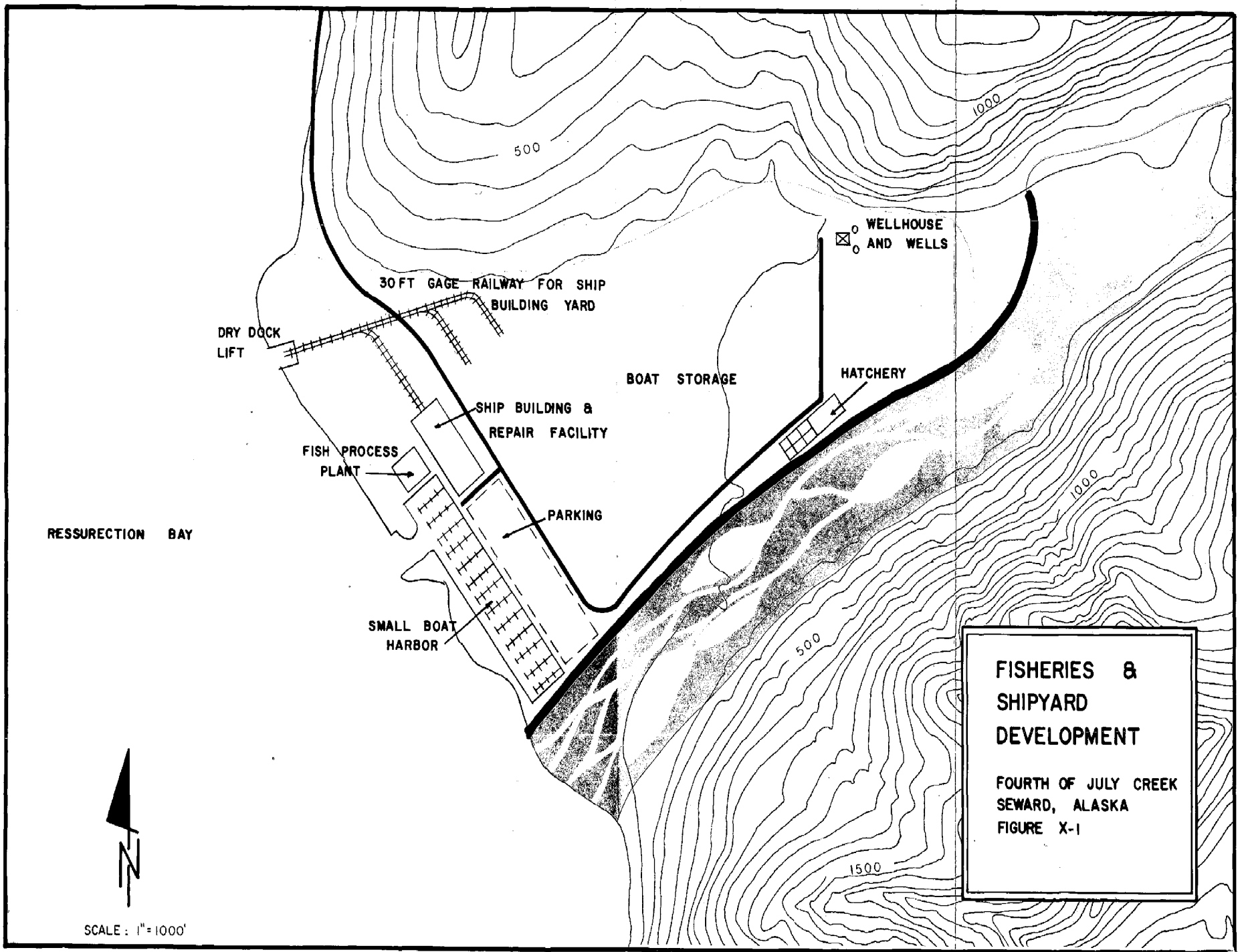
The needs of a fish processing plant are not especially complex. Access and utilities must be provided, but the primary requirement of a fishery deals with the land-sea interface. Adequate facilities to handle fishing vessels and their catch and means of loading and shipping the final product are of prime importance. A fisheries wharf should also be able to resupply the fishing vessels for the next fishing tour. Dock facilities for a fishery are discussed in Chapter VIII, Transportation, and possible arrangements are shown there.

A major drydock facility at the site should be able to handle 250-foot vessels. A lift with a railway of approximately 30-foot gage would be required as well as a large building for shipbuilding or repair work. The primary requirements of a deepwater port, basic utilities and large land area are all met at the site.

A roadway must be provided for labor and construction access and for a connection to the services and utilities at Seward. This type of development should not create extremely large electrical demands that require electrical generation at the site. To supply electricity to the development a transformer should be located at the site with a transmission line from the substation at Fort Raymond connecting to the site.

The fisheries industry water usage can be substantial with potential peak demands of 3000 gpm. Water can be supplied by a well field in the mid to upper valley. A water storage tank is required. Sewage disposal takes two forms; a reduction plant for the fish processing plant and on-site septic tank-leach field systems for domestic wastes. As the area develops a central sewage treatment plant may be necessary and can be constructed. Fuel can be supplied by the bulk plants at Seward to industry at the site and to fishing vessels. Solid waste generation from this development should not require special handling and can be taken care of through the Borough's existing landfill.

As the site is developed, other industries would join the fishery in locating there. A small commercial boat harbor for fishing vessels would be required in addition to the fisheries wharf at a minimum. A large sized general small boat harbor could also be constructed to relieve the present overcrowding at the existing small boat harbors in Seward. Finally, the State could build a hatchery in the valley utilizing the man-made pools in the creek relocation as rearing ponds. Figure X-1 shows a plan of the valley fully developed around fishery and shipbuilding industries.


500
1000
WELLHOUSE AND WELLS
30 FT GAGE RAILWAY FOR SHIP BUILDING YARD
DRY DOCK LIFT
BOAT STORAGE
HATCHERY
SHIP BUILDING & REPAIR FACILITY
FISH PROCESS PLANT
PARKING
RESSURECTION BAY
SMALL BOAT HARBOR
1000
500
1500
N
SCALE : 1" = 1000'
FISHERIES & SHIPYARD DEVELOPMENT
FOURTH OF JULY CREEK
SEWARD, ALASKA
FIGURE X-1

Costs for development are tabulated below. Actual industry costs are excluded. A discussion of methods for financing this development follows the four development plans.

Item	Cost (Millions)
Stream Relocation with dike	2.5
Lower Access Road (Paved)	3.4
Local Roads	.5
Fisheries Wharf and Small Boat Harbor	11.0
Electrical (with back-up)	1.4
Water System	1.0
Lagoon & Sewer System	.6
Total	20.0

PETROCHEMICAL

The needs of a petrochemical processing plant are not unlike those of other large industries. These include a large developable site, good access, raw material and product transportation systems, large amounts of electrical power, and the basic utilities. An industry based on petrochemical processing will need a large area with good foundation material for both product and raw material storage.

The industrial plant itself will need sufficient area for reactors, etc. as well as control buildings. Sufficient space available for future expansion also becomes a major factor in determining site useability. The Fourth of July Creek site provides a large useable area, with close to 700 acres of developable land in the valley, and over 300 acres of useable area on the bench. The lower route road access will provide good access for construction personnel and equipment, as well as operational staff. The road corridor will also provide a good routing for telephone lines or any pipelines to be placed. A main-line railraod access can provide raw material and product movement within Alaska. Raw petroleum could be moved from Fairbanks to Seward with tariffs around 8-9¢/gal.[1] Unit train movements may reduce this even more.

The Fourth of July site offers the additional value of being able to accommodate a tanker loading of off-loading terminal. The Fourth of July Creek area provides sufficient site room for

[1] Tariff rate estimated by Assistant to the General Manager of the Alaska Railroad during telephone conversation 2/26/79.

generation facilities. Salt and fresh water for cooling are available and the "bench" provides for good air diffusion of all stack emissions. The bench also provides bedrock foundation material for any heavy and/or vibrating loads that may be found in such systems. The Fourth of July area allows for economical development of water and sewer systems, and has access to existing normal solid waste and hazardous waste disposal sites.

Development

Once the training dike on the creek has been constructed and the initial access road is pushed through, actual development of the site can begin. As fish rearing ponds are developed and gravel is excavated the rail link to Woodrow and the access road to the bench can also be constructed. Raw and product material tank farms, the actual industrial complex and a tanker terminal, should be constructed simultaneously. Expansion of the complex and tank farms could be accommodated later by extensive use of the "bench". A rail-barge facility can also be added to accommodate rail car product movements out of Alaska.

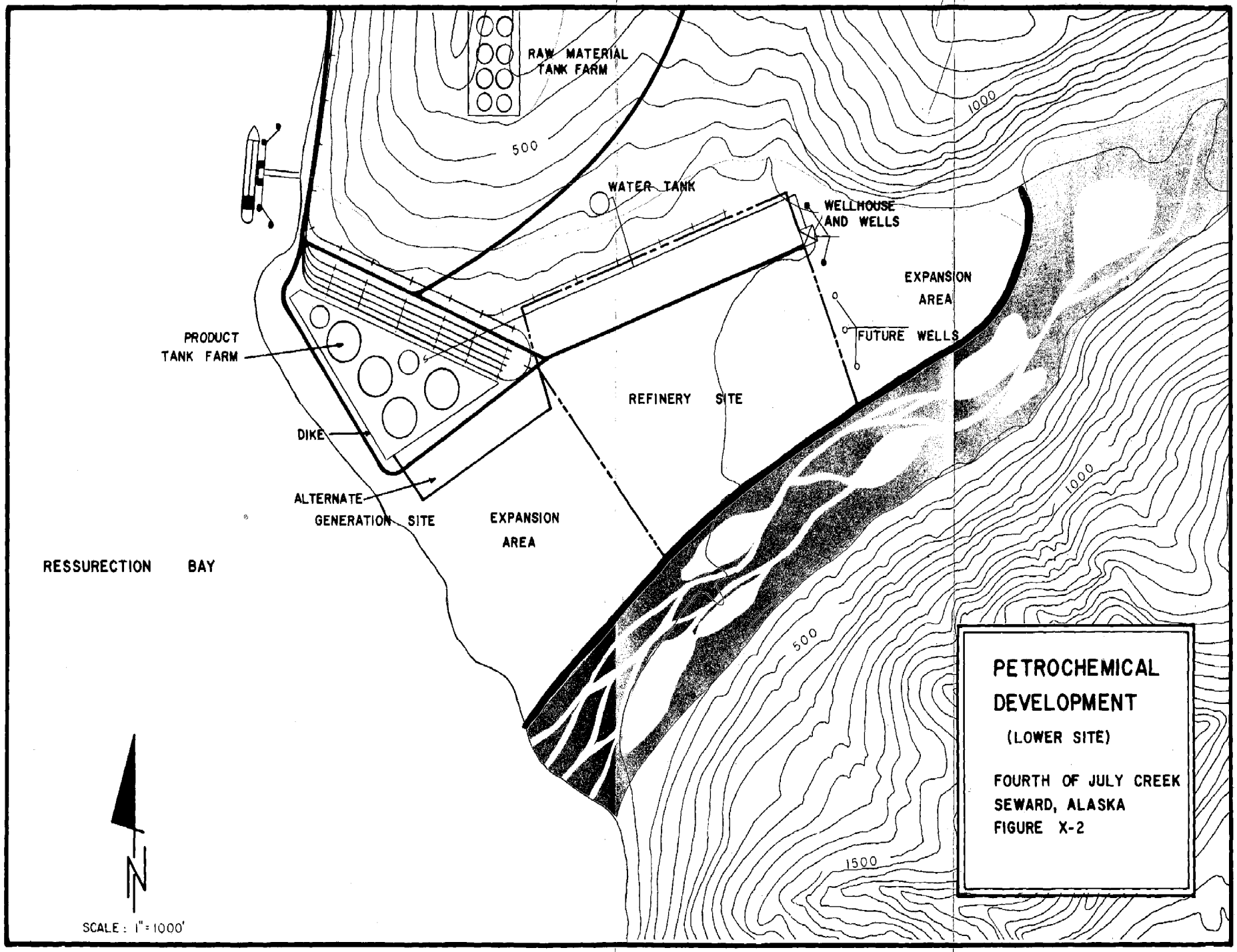
A power generation site and plant would need to be developed prior to completion of the industrial complex.

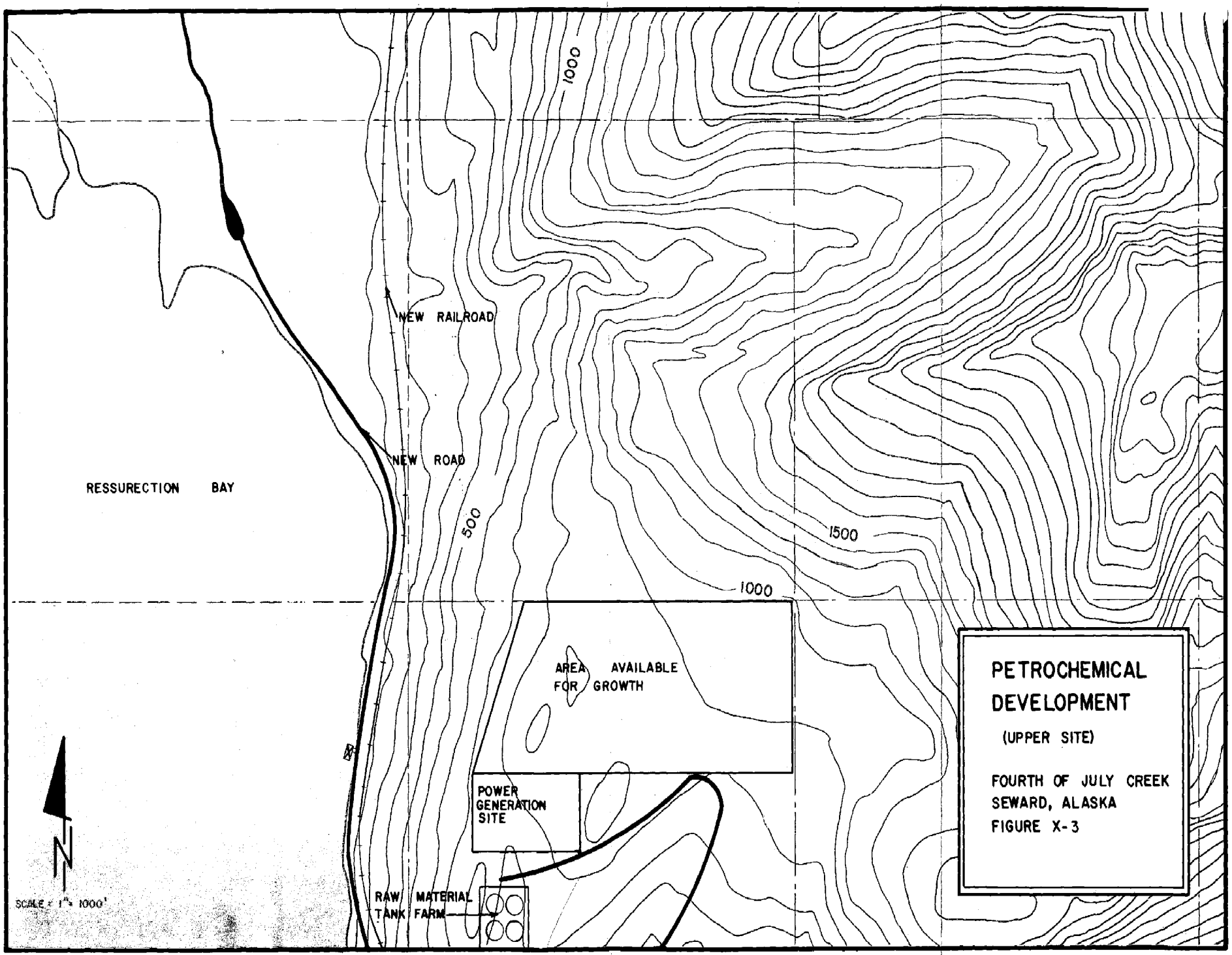
Some costs of the development are given below.

Item	Cost (Millions)
Stream relocation with dike	2.5
Lower Road Access	3.4
Access Road to "Bench"	0.6
Rail-Line Access	12.0
Local Rail Yard	1.7
Tanker Terminal	6.0
Local Roads	1.5
Water System	1.2
Rail-Barge Facility (optional)	6.1
Total	$35.0

FREIGHT HANDLING

A number of types of freight handling are possible as discussed


RAW MATERIAL
TANK FARM
500
1000
WATER TANK
WELLHOUSE
AND WELLS
EXPANSION
AREA
FUTURE WELLS
PRODUCT
TANK FARM
REFINERY SITE
DIKE
ALTERNATE
GENERATION SITE
EXPANSION
AREA
RESSURECTION BAY
1000
500
1500
N
SCALE : 1" = 1000'
PETROCHEMICAL
DEVELOPMENT
(LOWER SITE)
FOURTH OF JULY CREEK
SEWARD, ALASKA
FIGURE X-2


1000
NEW RAILROAD
NEW ROAD
RESSURECTION BAY
500
1500
1000
AREA AVAILABLE FOR GROWTH
POWER GENERATION SITE
RAW MATERIAL TANK FARM
N
SCALE: 1" = 1000'
PETROCHEMICAL DEVELOPMENT
(UPPER SITE)
FOURTH OF JULY CREEK
SEWARD, ALASKA
FIGURE X-3

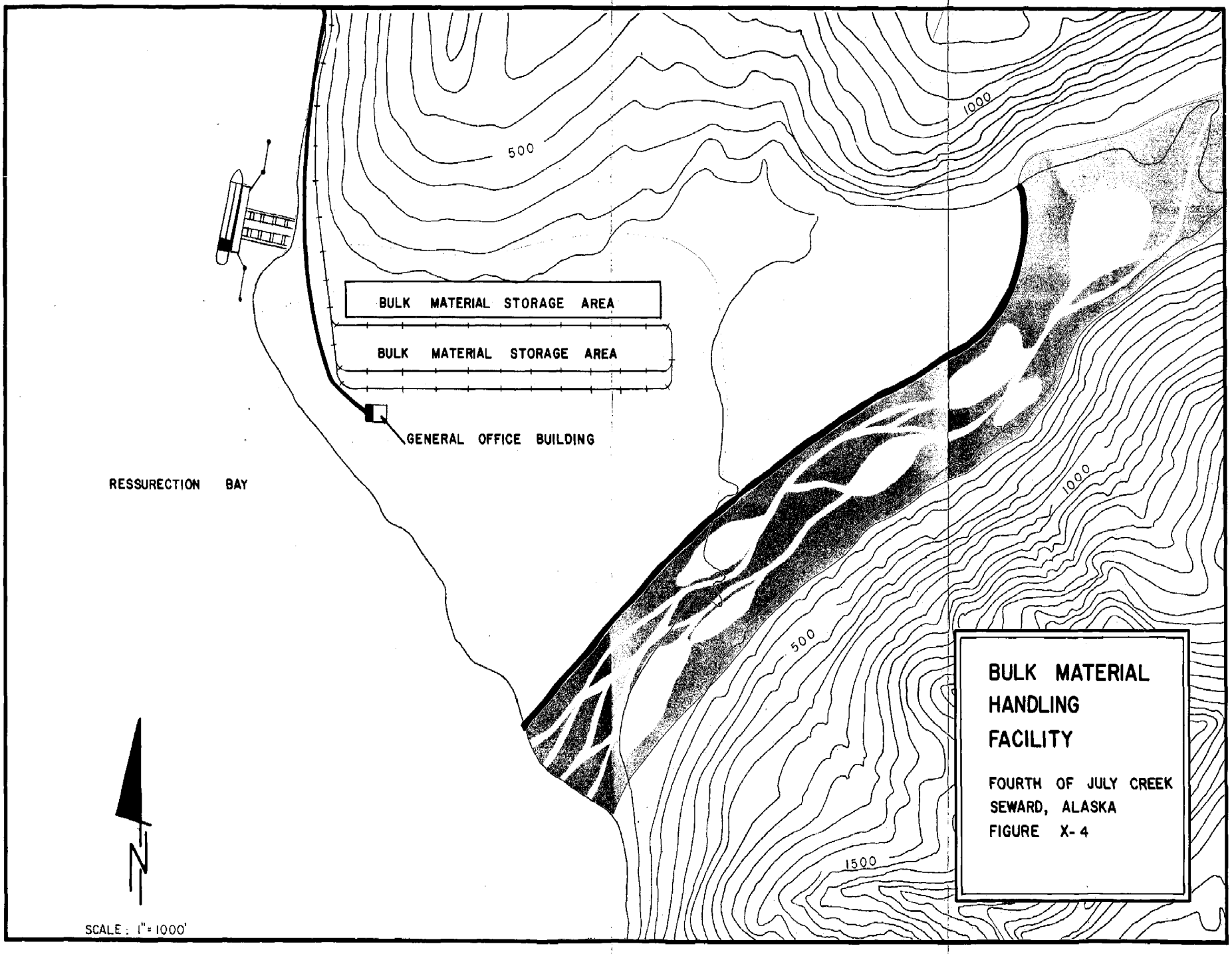
in Chapter VIII, Transportation. Containerized freight is presently handled in both Whittier and Anchorage. Both of these locations have advantages over Fourth of July Creek in being located closer to the population centers and largest markets plus being established, operating facilities. Both facilities are capable of increased volumes and could be expanded more readily than a new facility could be constructed in Seward. General cargo is brought into Alaska at Seward as well as Anchorage and Whittier. General cargo facilities at Fourth of July Creek would have the same disadvantages as containerized freight. Such a facility would also be competing with the existing facilities at Seward.

Bulk materials are not being shipped in any significant volume anywhere in the state at the present time. With resource development, however, the potential exists for bulk shipment of such items as coal, copper, zinc, lead, and other metal ores. No facilities exist for handling large quantities of materials of this type, so new facilities will have to be constructed. The Fourth of July Creek area offers an attractive site for such a facility. The bulk material could be shipped to the site by rail and stockpiled there for transferral to sea vessels and shipment to final markets.

A bulk material handling and storage facility will have very basic needs. Rail access must be provided for the material supply. A material handling system will be required to stockpile the material unloaded from rail cars and also to load sea vessels. The unit train concept should be used and the cars should only slow down to unload but keep rolling. Road access should also be provided to supply the site from Seward and for labor and construction access.

The dock facility should be a bulk material loading facility as described in Chapter VIII, Transportation. Utilities and services in general will rely on the existing facilities at Seward. A bulk material handling system will not require extremely high electrical consumption. A distribution line should be installed to run from the substation at the highway to the industrial site. Water can be supplied by a single well. Sewage wastes will be domestic and quantities will be low as this development won't employ a large number of people. A septic tank and leach field is adequate. Solid wastes should be disposed of at the existing Borough landfill.

Figure X-4 shows a bulk material storage and shipping facility. Development costs for this plan are estimated and given in the following table, but the industries direct cost are excluded.


500
1000
BULK MATERIAL STORAGE AREA
BULK MATERIAL STORAGE AREA
GENERAL OFFICE BUILDING
RESSURECTION BAY
1000
500
1500
N
SCALE : 1" = 1000'
BULK MATERIAL HANDLING FACILITY
FOURTH OF JULY CREEK
SEWARD, ALASKA
FIGURE X-4

Item	Costs (Millions)
Stream Relocation with Dike	2.5
Lower Access Road (Gravel)	2.9
Rail Line Access	12.0
Local Rail Yard	.8
Bulk Material Port Terminal	6.0
Total	$24.2

HEAVY INDUSTRY

A metal refinery or reduction plant at Seward appears to be compatible with the resource availability and economic factors characteristic of the Seward area. Modern metal reduction plants can be either electrolytic or utilize classical smelting techniques, but modified to reclaim the unwanted sulfur-rich gases which formerly were major pollutants. Modern refineries or reduction plants have been built at Clarksville, Tennessee and Inspiration, Arizona which have very good operating characteristics as far as pollutants are concerned.

Refineries are dependent on availability of both mineral concentrates and on relatively inexpensive energy. Metal concentrates are at least potentially available in Alaska and the Yukon Territory. In the last fifteen years major deposits of massive sulfide-type have been found in Alaska, and several are productive in Canada. The Alaskan deposits are basically zinc-copper type, as at the Arctic or Picnic Creek deposits, or zinc-lead type in the Red Dog-Lik area in the Brooks Range, occurrences in the north flank of the Alaska Range, and at Greens Creek at Admiralty Island. A zinc refinery, probably of electrolytic type, would enhance the economic potential of all of these deposits, probably more than either a copper or lead refinery. Because of the high metal-sulfur ratio, a lead concentrate could be shipped out of Alaska for refining; and, although copper concentrates often contain high sulfur contents, the common presence of gold and silver in a copper concentrate, as well as the higher price obtained for copper than zinc, may also enable economical copper concentrate export.

Zinc concentrates are potentially available to an Alaska refinery from the Yukon, and it is at least possible that Alaska could capture some of the water-borne concentrates now shipped to East Helena, Montana and Bunker Hill, Idaho via the port of Portland, Oregon.

Energy is at least potentially available at Seward from hydropower sites, or from oil fuel products for the Trans Alaska pipeline.

The resources for a zinc plant are at least potentially identified and could be produced with present technology. There is also the possibility that a refinery for sea-floor nodules containing copper, nickel, and cobalt in a manganiferous matrix could be located at Seward. Although mining techniques are available for nodules, there remain major legal and technical problems, as well as that of marketing the abundant manganese product.

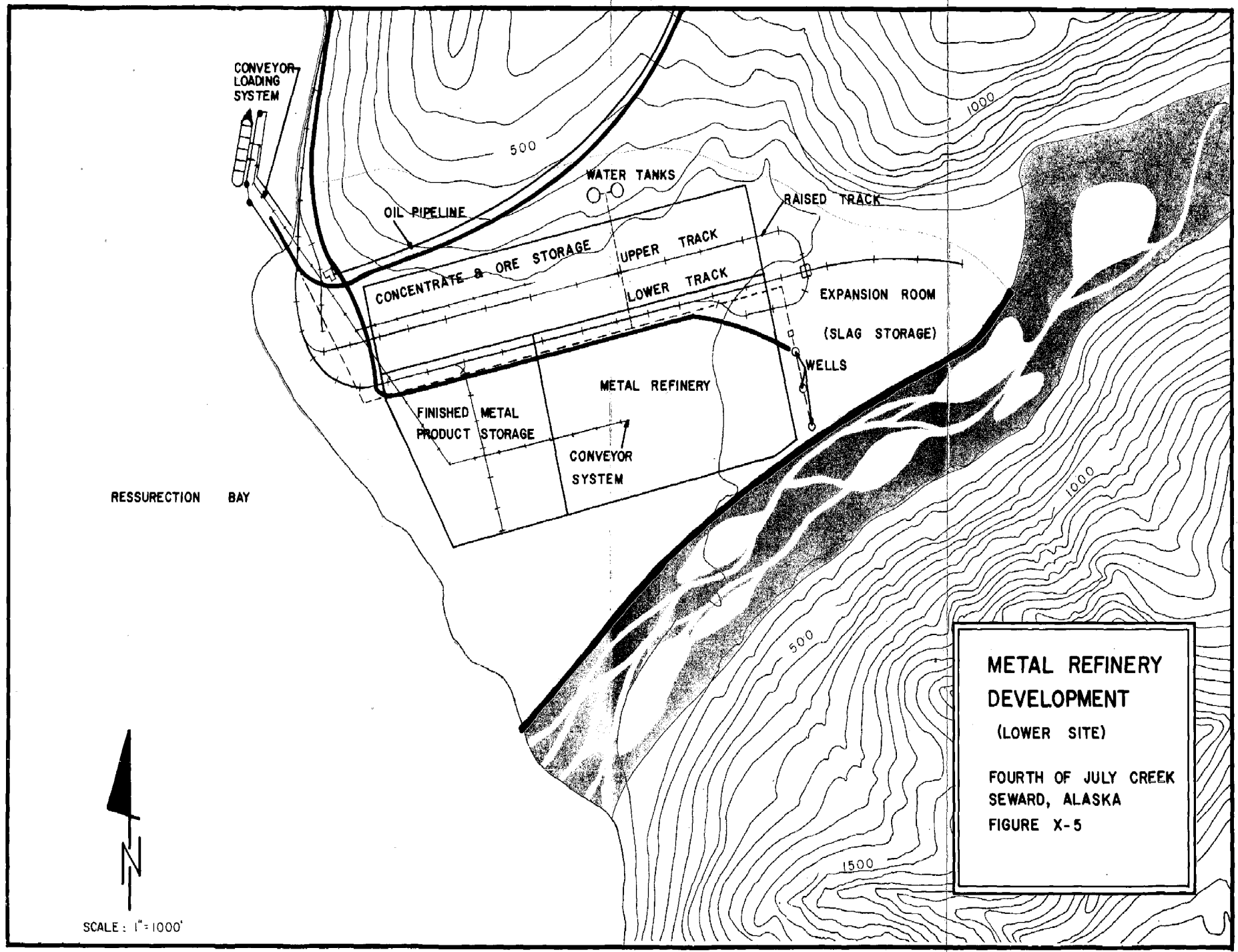
Technical capability for operation and construction of metal refineries is available within several of the mining corporations now operating in the state.

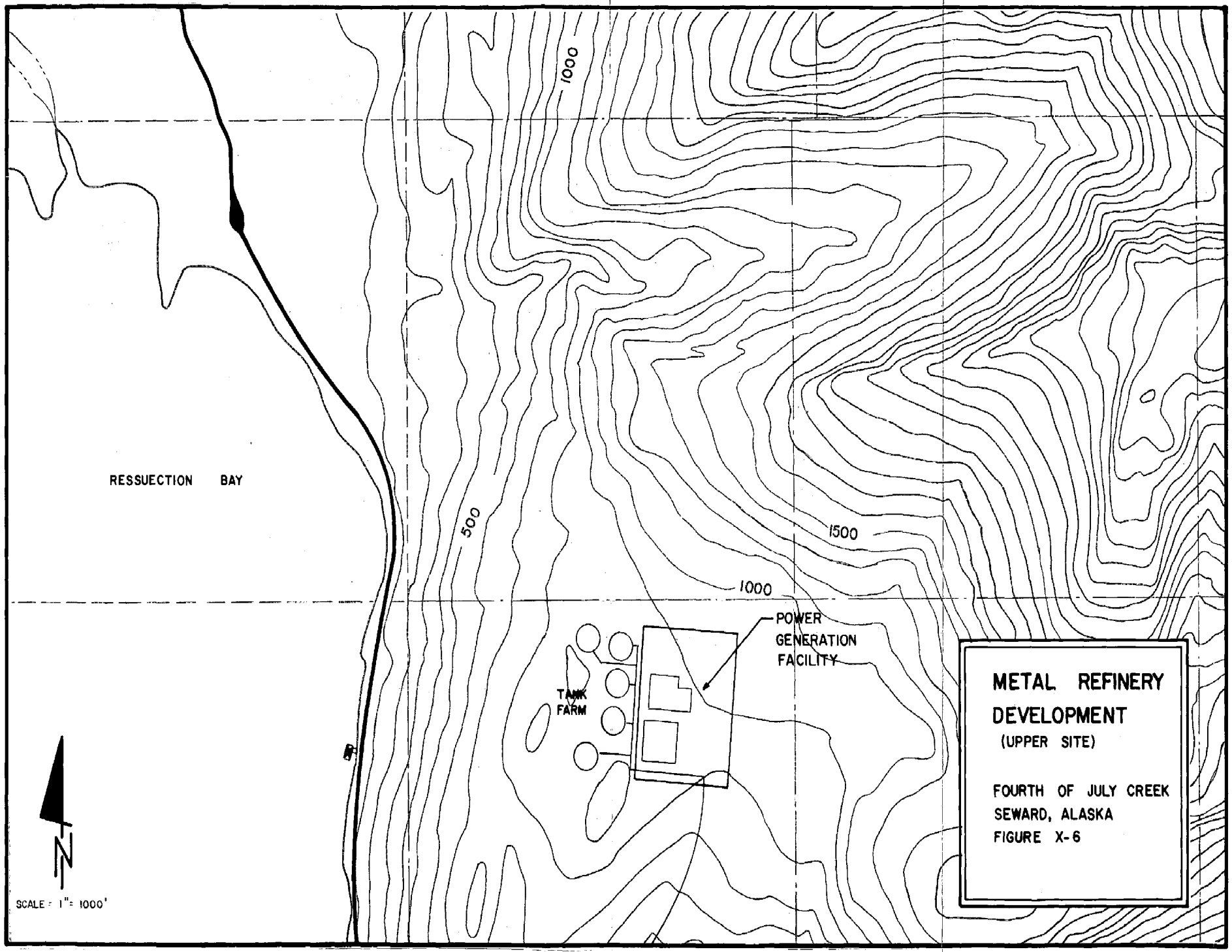
A metal refinery will require a road to the site for labor and service access, a rail connection to the mainline track for raw material supply and a port facility for shipment of refined metal and also to receive ore from other sources. The port facility requirements can be met by a bulk material terminal similar to the design presented in the transportation chapter.

Utilities for the facility will include a well field and storage tank for water and septic tank systems for domestic sewage wastes. Electrical demands will be large and on-site generation must be provided. The power generation facilities should be constructed to also provide the City of Seward with power and share investment costs.

Basic utility and access costs for this industrial site are estimated in the following table. Figure X-5 shows a possible layout for the metal refining industry at Fourth of July Creek.

Item	Cost (Millions)
Stream Relocation With Dike	$2.5
Lower Access Road (Paved)	3.4
Access Road To Upper Area	.6
Rail Line Access	12.0
Local Rail Yard	.8
Bulk Material Port Terminal	6.5
Water System	1.2
Total	$27.0


CONVEYOR LOADING SYSTEM
500
1000
WATER TANKS
OIL PIPELINE
RAISED TRACK
CONCENTRATE & ORE STORAGE
UPPER TRACK
LOWER TRACK
EXPANSION ROOM
(SLAG STORAGE)
WELLS
METAL REFINERY
FINISHED METAL PRODUCT STORAGE
CONVEYOR SYSTEM
RESSURECTION BAY
1000
500
1500
N
SCALE : 1"=1000'
METAL REFINERY DEVELOPMENT
(LOWER SITE)
FOURTH OF JULY CREEK
SEWARD, ALASKA
FIGURE X-5


RESSUECTION BAY
1000
500
1500
1000
POWER GENERATION FACILITY
TANK FARM
N
SCALE = 1" = 1000'
METAL REFINERY DEVELOPMENT
(UPPER SITE)
FOURTH OF JULY CREEK
SEWARD, ALASKA
FIGURE X-6

FUNDING

Access, site utilities, and some local improvements may be eligible for funding aid from a variety of sources. Both State and Federal agencies have programs that can provide aid to the City of Seward for improvements. Aid may come in several forms; grants, loans, low interest bonds, federal agency programs, etc.

Railroad access to the Fourth of July Creek area (mainline or rail-barge facility) may be funded in a number of ways. One would be for the developer to construct the facilities. Another method, possible only if the industry moving in could certify use of sufficient rail traffic, would involve a U.S. congressional appropriation to the Alaska Railroad for construction of the facilities. This would reflect a slightly higher tariff rate to repay the capital investment. A third method would involve a cooperative effort of several parties, including the City of Seward, the State of Alaska, industry, private citizens benefiting from the railroad, and the Alaska R.R. under a cost sharing program.

Road access to the industrial site can be provided by funding other than the industrial developer. Nash Road is presently a State maintained secondary road. Funding for the extension of this road may be available through the Alaska Department of Transportation and Public Facilities. The City of Seward may need to approach the Regional Planning Manager for the Central Region (Alaska D.O.T.) and certify the necessity of the road, and obtain a priority position within the Capital Improvement Program. If sufficient funds are not available, or other reasons prevent the improvement of Nash Road under this program an effort may be made to obtain a direct legislative appropriation for the Alaska State Legislature for the required improvements and extension.

Site utilities such as water and sewer are eligible for 50% matching funds from the State Department of Environmental Conservation. These funds will only match the amount the City provides. Other programs providing funds in the hundred thousand dollar range for public utilities and facilities include the U. S. Department of Commerce Economic Development Administration, Public Works Grant Program; and the Housing and Urban Development Block Grant Program.

Port facilities other than small boat harbors have a low potential for government funding. Presently the City of Seward is eligible for a $500,000 grant for port facilities other than small boat berthing facilities. Other grant or matching funds do

not appear to be available at this time. The Corps of Engineers is planning a study of the most economical method of expanding the small boat harbor facilities in Seward. This is to take place sometime in 1979, but present attitude is that the Fourth of July site is not feasible due to lack of access, etc. The Corps of Engineers has no funding or authority to construct the expansion at this time. In order for the Corps of Engineers to design and construct a harbor congressional authority and an appropriation is required. Such appropriations have historically only been for about 50% of the needed funds, requiring State and local participation to complete the funding. The State presently has $2.0 million of approved bonding it can sell to provide for small boat harbor funding in Seward.

The City of Seward can obtain large amounts of capital for construction by selling bonds. The Farmers Home Administration can buy large amounts of bonds at interest rates around 5% for certain types of projects. Flood protection structures, utilities, and port facilities may all be acceptable for this type of program. All specialized construction and development unique to a specific industry would require private capital. However, the City and the State could utilize bonding as a means of financing support if this total concept made good sense.

CHAPTER XI

RECOMMENDATIONS

This study has shown the feasibility of industrial development at Fourth of July Creek. Known facts about the area were collected and interpreted and other factors such as transportation, utilities, etc. were analyzed. A preliminary soil analysis was also conducted. Before any development is initiated in the area, however, more specific investigations and studies must be undertaken. The following subjects are recommended for further study:

- A comprehensive soils study of the water - delta interface area should be conducted to conclusively determine the probability and danger of submarine landslides.
- Detailed site - specific soil analysis should be conducted before any design or construction is begun.
- A groundwater study is scheduled to be conducted in the fall of 1979.
- A detailed floodplain analysis should be undertaken to determine the hazard of both creek and coastal flooding.
- A field investigation will be required to select the final access road alignment.
- A port facility study should be conducted to determine the best location and methods of construction for dock facilities.
- A comprehensive power requirements study should be developed to evaluate the alternatives available for supplying power to the industrial park.
- Comprehensive water and wastewater facility plans should be developed concurrently with any proposed development plans.

The subjects for study listed above must be evaluated during the planning stages of any development. Several other items should receive immediate attention, however, because development at Fourth of July Creek will be dependent upon them. These are:

- Easements for access road rights-of-way should be developed now to prevent delays when development in the area begins.
- Details for relocation of the creek should be negotiated with Alaska Department of Fish & Game at an early date to determine total cost for this improvement.

- The Nash Road extension should be placed on the Alaska Department of Transportation and Public Utilities Capital Improvement Program so that it may receive State funding.

REFERENCES

1) Geologic Factors Bearing on Development at Five Sites in Upper Resurrection Bay, State of Alaska Department of Natural Resources, 1976.

2) Report on Subsurface Investigation for City of Seward, Alaska and Vicinity, Shannon and Wilson, Inc., 1964.

3) Flood Plain Information - Resurrection River and Salmon Creek, Seward, Alaska, Department of the Army, Alaska District Corps of Engineers, 1975.

4) Resurrection Bay SFC Wind, R. Schulz, U.S. National Weather Service.

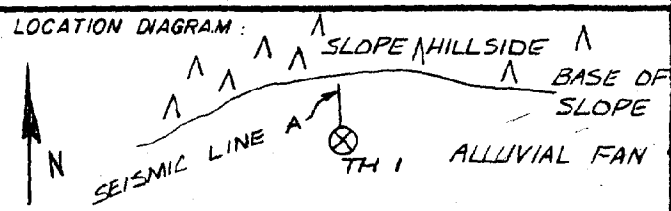
5) Surface Winds in Some Alaskan Coastal Passes, G. Phillip Weber, Weather Bureau, Airport Station, Anchorage, Alaska.

6) Seward Concept Plan, Kramer, Chin & Mayo, Inc., 1975.

7) Seward Port Facility Study for Seward, Alaska, R&M Consultants, Inc., 1977.

APPENDIX

PROJECT 4TH OF JULY CRK, SEWARD	TEST BORING NO. 1
LOCATION SEISMIC LINE A	SHEET NO. 1 OF 2
	TOTAL DEPTH 50 FT.
	DATE BEGUN 8-2-78
LOCATION DIAGRAM:	DATE COMPLETED 8-2-78
	GEOLOGIST W. KLINE
	FIELD PARTY JACKSON, REAS
	WEATHER SUNNY 75°
	VEGETATION BULLDOZED CLRG
	DRILL METHOD CME 55 8" HOLLOW ST



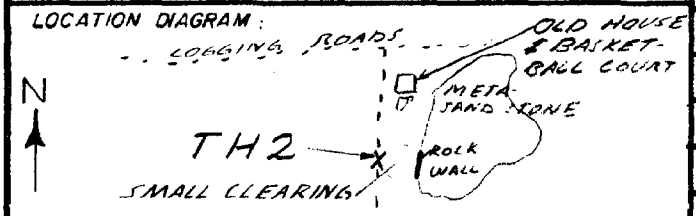
SAMPLE NO.	BLOW COUNT	LOCATION SAMPLED	RECOVERY	DEPTH	% ICE	FROZEN SOIL GRAPH	DESCRIPTION
				1			SLIGHTLY MOIST 0-30'
				2			[SAND W. SOME GRAVEL, (HIGH) TRACE SILT]
				3			
				4			
1.4	①	23/31		5			SAMPLE 1 5-6.5' POOR RECOVERY RETAINED ONLY FROM 6-6.5'
		37		6			
				7			
				8			
				9			
				10			[SANDY GRAVEL W. TRACE SILT] FEW SCATTERED COBLES
				11			LARGE COBLES 10-10.5' HARD DRILLING
				12			
				13			
				14			
				15			
1.4	②	14/62		16			SAMPLE 2 15-15.5' POOR RECOVERY RETAINED ONLY FROM 16-16.5'
		67					INCREASE IN COBLES BELOW 20-25'
				17			
				18			
				19			
				20			
				21			
				22			BOULDERS 21-23'
				23			
				24			
				25			SAMPLE 3 GRAB SAMPLE AT 25' MATERIAL SAME AS ABOVE
	③			26			
				27			EASIER DRILLING 26-30' DECIDED TO CONTINUE
				28			TIP OF ROD WET AT 30'
				29			[SAND W. TR. SILTY GRAVEL]
				30			PROBABLY TRACE SILT & GRAVEL NO RETURNS DUE TO H_2O TABLE
							WET 30 TO 31.5'

PROJECT 4TH OF JULY CRK., SEWARD	TEST BORING NO. 1
LOCATION SEISMIC LINE A	SHEET NO. 2 OF 2
	TOTAL DEPTH 50 FT.
	DATE BEGUN SEE PG. 1
LOCATION DIAGRAM: SEE PG. 1	DATE COMPLETED
	GEOLOGIST
	FIELD PARTY
	WEATHER
	VEGETATION
	DRILL METHOD

SAMPLE NO.	BLOW COUNT	LOCATION SAMPLED	RECOVERY	DEPTH	% ICE	FROZEN SOIL	GRAPH	DESCRIPTION
4	14/9/12			31				SAMPLE 4 30-31.5' WASH → NOT SUBMITTED EASY DRILLING TO 38' WATER TABLE @ 31.5' WHILE DRILLING
				32				
				33				SAND W. TR. SILT & GRAVEL
				34				
				35				SATURATED BELOW 31.5' NO RETURNS
				36				
				37				
				38				MODERATE DRILLING 38-50' PICKING UP GRAVEL AGAIN
				39				
				40				SANDY GRAVEL W. TR. SILT
				41				
				42				VERY FEW SCATTERED COBLES NO RETURNS
				43				
				44				
				45				
				46				
				47				
				48				
				49				
				50				
5								TD 50' SAMPLE 5 ATTEMPT TO SAMPLE AT 50' WAS ABANDONED DUE TO HOLE SLOUGHING IN

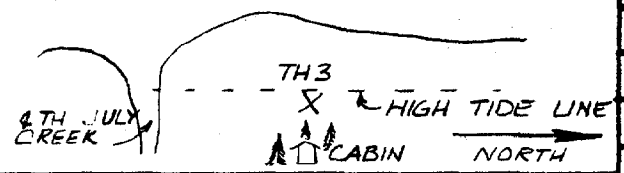
PROJECT 4th of JULY CREEK	TEST BORING NO. 2
LOCATION Seward - WEST SIDE META-SEDIMENT OUTCROP, CENTER OF FAN. IN CLEARING ALONG OLD ROAD	SHEET NO. 1/1
	TOTAL DEPTH 30 ft
	DATE BEGUN 8/2/78
	DATE COMPLETED 8/2/78
	GEOLOGIST W. KLINE
	FIELD PARTY P. JACKSON, D. REAS
	WEATHER SUNNY ~75°F
	VEGETATION MOD. DENSE SPRUCE to 40' (SOME COTTENWOOD)
	DRILL METHOD CME 55 8" HOLLOW STM.

LOCATION DIAGRAM:



SAMPLE NO.	BLOW COUNT	LOCATION SAMPLED	RECOVERY	DEPTH	% ICE	FROZEN SOIL GRAPH	DESCRIPTION
				1			0-0.5 SILT WITH SOME SAND SLIGHTLY MOIST 0-5'
				2			
				3			SILTY GRAVEL W/ SOME SAND
				4			
(1)		↓		5			SAMPLE 1 = 4.5' GRAB
				6			COARSER @ 5' SCATTERED COBBLES 5-7' MOIST 5-12'
				7			
				8			GRAVEL W/ SOME SAND AND SILT
				9			FAIRLY FAST DRILLING 7-12'
				10			
				11			
				12			
				13			A FEW SCATTERED COBBLES 12'-20' VERY MOIST 12-26'
				14			
				15			
(2)		↓		16			SAMPLE 2 = 15' GRAB
				17			
				18			
				19			
				20			
				21			COARSER GRAVEL BELOW 20' ALSO MORE COBBLES
				22			
				23			
				24			
				25			
(3)		↓		26			SAMPLE 3 = 25' GRAB WET 26'-30'
				27			
				28			
				29			NOTE: FROM 28½-30' THE END ROD WAS WET WHEN PULLED OUT OF HOLE. IN VICINITY OF WATER TABLE
							TD: 30'

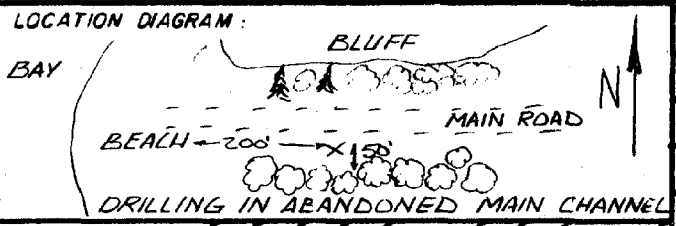
PROJECT 4TH OF JULY CRK. SEWARD	TEST BORING NO. 3
LOCATION BEACH ≈ 400' N. OF 4TH OF JULY CREEK	SHEET NO. 1 OF 1
	TOTAL DEPTH 30 FT
	DATE BEGUN 8-3-78
LOCATION DIAGRAM: RESURRECTION BAY	DATE COMPLETED 8-3-78
	GEOLOGIST W. KLINE
	FIELD PARTY JACKSON, REAS
	WEATHER OVERCAST 55°
	VEGETATION OPEN SPRUCE TO EAST
	DRILL METHOD CME 55 8" HOLLOW ST



SAMPLE NO.	BLOW COUNT	LOCATION SAMPLED	RECOVERY	DEPTH	% ICE	FROZEN	SOIL GRAPH	DESCRIPTION
				1				MOIST 0-9'
				2				
				3				SAND W. SOME GRAVEL, TR SILT
				4				
				5				
				6				
				7				
				8				
				9				WATER TABLE @ 9'
								SATURATED 9-30'
1.4	①		12/15/12	10				SAMPLE 1 - FAIR RECOVERY 10-11' SAND W. SOME SILT & GRAVEL
				11				
				12				
				13				FEW SCATTERED COBLES 12-30'
				14				
				15				
				16				
				17				
				18				
				19				SANDY GRAVEL AND GRAVELLY SAND
1.4	②		22/65/62	20				SAMPLE 2 GRAVELLY SAND W. TR. SILT
				21				
				22				
				23				
				24				
				25				
				26				
				27				
				28				
				29				
				30				TD 30

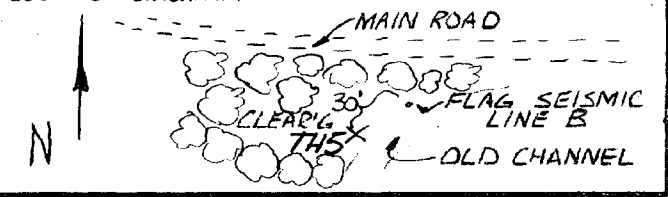
PROJECT 4TH OF JULY CRK., SEWARD	**TEST BORING NO.** 4
LOCATION 15' S. OF MAIN LOGGING ROAD & 200' E. OF UNVEGETATED BEACH	**SHEET NO.** 1 OF 1
	TOTAL DEPTH 30 FT.
	DATE BEGUN 8-3-78
	DATE COMPLETED 8-3-78
	GEOLOGIST W. KLINE
	FIELD PARTY JACKSON, REAS
	WEATHER PARTLY CLDY 68°
	VEGETATION ALDERS @ EDGE CLRG
	DRILL METHOD CME 55 8" HOLLOW ST

LOCATION DIAGRAM:

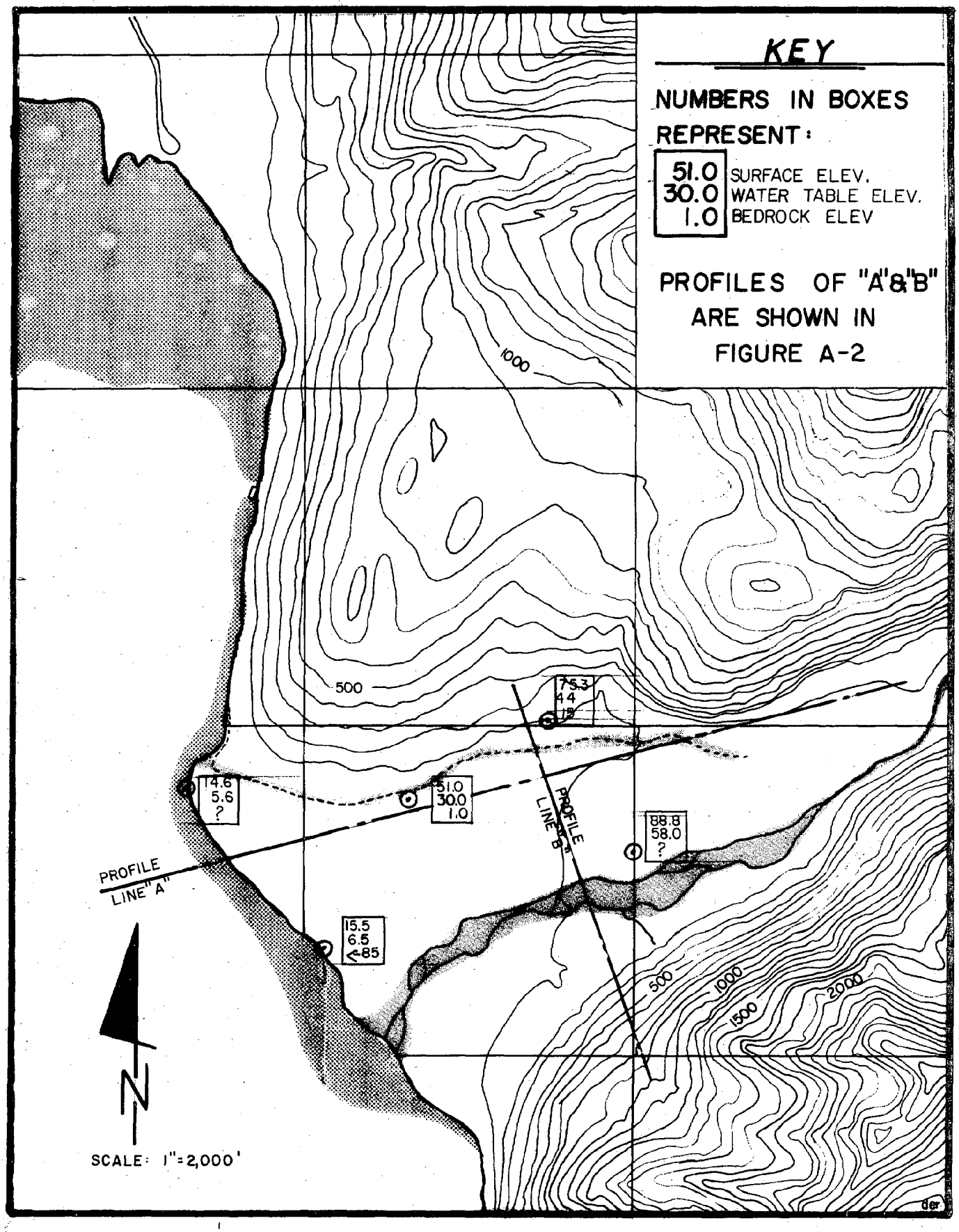


SAMPLE NO.	BLOW COUNT	LOCATION SAMPLED	RECOVERY	DEPTH	% ICE	FROZEN SOIL GRAPH	DESCRIPTION
				1			NUMEROUS COBLES 0-9'
				2			HARD DRILLING 0-9'
				3			
				4			GRAVEL
				5			
				6			BOULDER 5.5-6.5'
				7			
				8			
				9			WATER TABLE 9' EASIER DRILLING
				10			
1.4	①	14	X	11			SAMPLE 1: 6" RECOVERY
	L	REF	X				SCATTERED COBLES 9-30'
				12			SATURATED BELOW 9'
				13			
				14			
				15			SANDY GRAVEL W. (HIGH) TRACE SILT
				16			
				17			
				18			
				19			
				20			
				21			
				22			
				23			
				24			
				25			
				26			
				27			
				28			
				29			
				30			TD 30'

PROJECT 4TH OF JULY CRK. SEWARD	**TEST BORING NO.** 5
LOCATION 30' W. SEISMIC LINE B IN CLEARING ALONG OLD CHANNEL	**SHEET NO.** 1 OF 1
	TOTAL DEPTH 30 FT.
	DATE BEGUN 8-4-78
LOCATION DIAGRAM:	**DATE COMPLETED** 8-4-78
	GEOLOGIST W. KLINE.
	FIELD PARTY JACKSON REAS
	WEATHER SUNNY 70°
	VEGETATION ALDERS TO 15'
	DRILL METHOD CMESS 8" HOLLOW ST

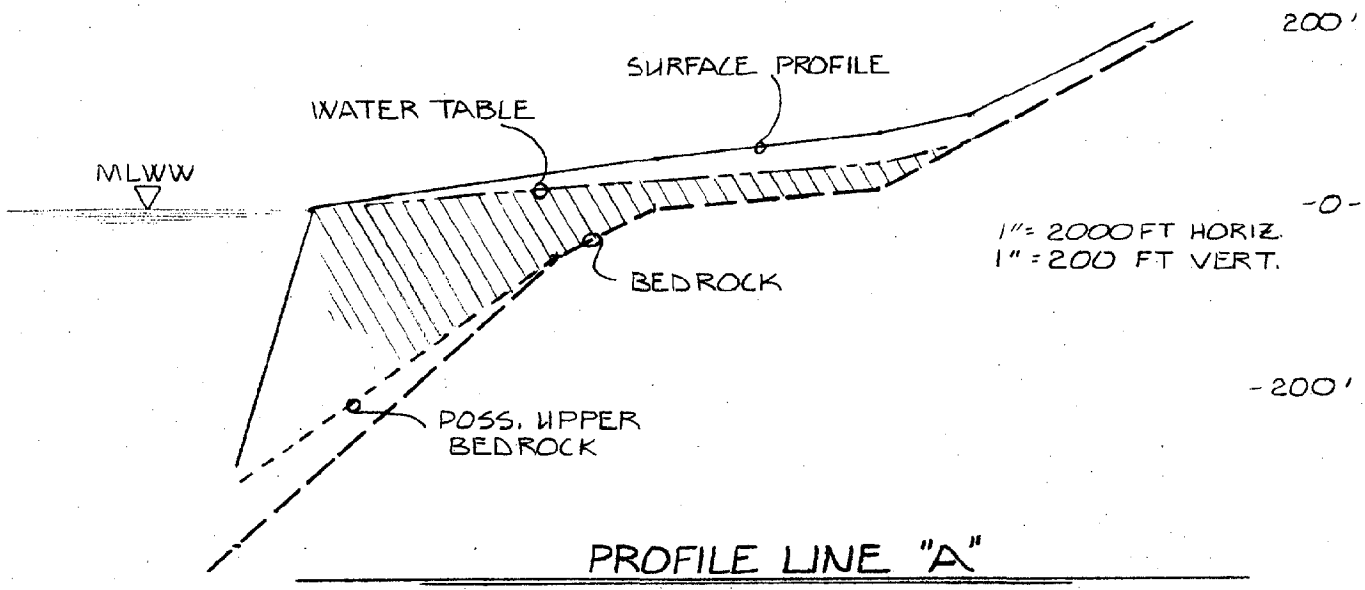


SAMPLE NO.	BLOW COUNT	LOCATION SAMPLED	RECOVERY	DEPTH	% ICE	FROZEN	SOIL GRAPH	DESCRIPTION
				1				SURFACE: GRAVEL & COBLES
				2				SANDY GRAVEL
				3				NUMEROUS COBLES 0-14'
				4				DRY 0-14'
				5				HARDER DRILLING 5-6' PROBABLY COBLE LAYER
				6				
				7				
				8				
				9				SANDY GRAVEL W. TR. SILT
				10				
				11				
				12				SLIGHTLY EASIER DRILLING 12'-13'
				13				
				14				
				15				SAMPLE 1: 15-16' FAIR RECOVERY
1.4	①	17		16				SLIGHTLY MOIST 14'-
		17						SANDY GRAVEL W. SOME SILT
		BOULDER		17				SCATTERED COBLES 14-18'
				18				(SLIGHTLY EASIER DRILLING)
				19				HARD DRILLING 18-26', NUMEROUS COBLES AGAIN
				20				
				21				VERY HARD 20-21' COBLE LAYER OR BOULDER
				22				
				23				SANDY GRAVEL W. TR. SILT
				24				COBLE LAYER 23-24'
				25				GRAVEL W. SOME SAND
	②			26				SAMPLE 2 GRAB
				27				SCATTERED COBLES 26-29'
				28				MOIST 26-29'
				29				SANDY GRAVEL W. TR. SILT
				30				END ROD WET BELOW 26' WHEN PULLED OUT OF HOLE
								BOULDER OR COBLE LAYER POSSIBLE H_2O TABLE 29-30'

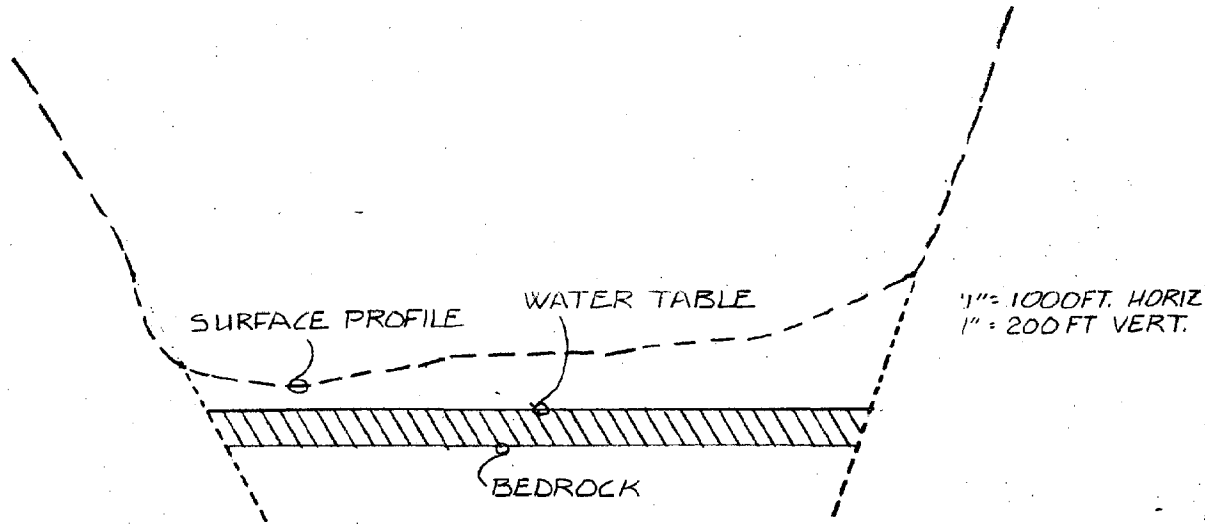


GROUNDWATER POTENTIAL ANALYSIS

FIGURE A-1



PROFILE LINE "A"



PROFILE LINE "B"

REVISION	DATE	BY

Arctic Environmental Engineers
Anchorage, Alaska

PROJECT NO. 78-011
DESIGNED: DPW
DRAWN: DER
CHECKED: FKV
DATE: 3-79
SCALE: AS SHOWN

GROUND WATER PROFILE
LINES "A" & "B"
FOURTH OF JULY CREEK
FIGURE A-2

SHEET

Approximation of Groundwater Flow

Method and permeability values taken from:
Hydrology for Engineers, Linsley, Kohler, Paulhus, McGraw-Hill Book Company, New York New York 1958

Q C gallons 1 day) = Kp A s
Kp = permeability in gpd/sq. ft.
A = cross-sectional area in sq. ft.
s = hydraulic slope parallel to flow in ft/ft

From Table 6-2

Material	Permeability Gpd/sq.ft.
Clay	1
Sand	800
Gravel	5,000
Sand & Gravel	2,000
Sandstone	700

Use Kp = 1,000 gpd/sq.ft.
A = 3.45×10^6 ft^2
s = $(58-6.5)/5,400 = 9.9 \times 10^3$ ft/ft

Q= Kp A s
= $1,000 \times 3.45 \times 10^6 \times 9.9 \times 10^3$
= 34.16 MGD

IN REPLY REFER TO
2620 (941)
A-056973

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Alaska State Office
701 "C" Street, Box 13
Anchorage, Alaska 99513

MAR 30 1979

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

DECISION

State of Alaska	:	A-056973
Division of Lands	:	
323 East Fourth Avenue	:	General Purposes
Anchorage, Alaska 99501	:	State Selection

Application Rejected In Part
Lands Proper for Selection
Tentative Approval Given

On April 13, 1962, the State of Alaska filed selection applications A-056973 and A-056975, covering all available lands in T. 1 S., R. 1 E., Seward Meridian under the provisions of section 6(b) of the Statehood Act of July 7, 1958 (72 Stat. 339-343). These selections were later combined under serial number A-056973. On July 18, 1966, the State amended its selection application to include the lands now described as U.S. Survey No. 4828 which had been restored to the public domain by Public Land Order No. 3893. On September 6, 1967, the State amended its selection to include the lands now described as U.S. Survey 4827. On June 16, 1972, the State amended its selection to include all lands in the township excluding patented lands, including lands formerly embraced in headquarters site application A-034014.

Section 6(b) of the act of July 7, 1958, granted the State the right to select lands which are "vacant, unappropriated and unreserved at the time of their selection." The lands in sections 1 through 6, inclusive, T. 1 S., R. 1 E., Seward Meridian, are within the Chugach National Forest, are unavailable for State selection and therefore the selection application must be and is hereby rejected for these lands.

The lands in U.S. Survey 4827 and U.S. Survey 4828 and the lands formerly embraced by headquarters site A-034014 are not separated from other lands available for selection, therefore comprising isolated tracts of public land which are unreserved, are not known to be occupied or appropriated

under the public land laws, including the mining laws, are not valuable for hot or medicinal springs, otherwise conform to the requirements of and are properly selected pursuant to the Statehood Act of 1958.

In view of the foregoing, the following described lands, aggregating 473.87 acres of surveyed land and approximately 5 acres of unsurveyed land are considered proper for acquisition by the State and are hereby tentatively approved:

U.S. Survey 4827, Alaska situated on the easterly shore of Resurrection Bay.

and

U.S. Survey 4828, Alaska situated on the easterly shore of Resurrection Bay.

and

The unsurveyed land in protracted T. 1 S., R. 1 E., Seward Meridian, more particularly described as:

Beginning at corner No. 1 (a spruce tree 12 inches in diameter) which bears approximately E. 35°N., ½ mile from corner No. 2 of U.S. Survey 1651, thence northerly 460 feet to corner No. 2 (a round spruce stake), thence easterly 460 feet to corner No. 3 (a flat spruce stake), thence southerly 460 feet to corner No. 4 (a flat spruce stake), thence westerly 460 feet to corner No. 1 the point of beginning. (Lands formerly embraced by headquarters site A-034014.)

When the lands are patented to the State, the patent will contain a reservation for canals and ditches under the act of August 30, 1890 (26 Stat. 391) and a reservation to the United States of a right-of-way for the construction of railroads, telegraph, and telephone lines under the act of March 12, 1914 (38 Stat. 305).

Pursuant to the Alaska Native Claims Settlement Act of December 18, 1971 (85 Stat. 688), there will also be reserved for the benefit of the Alaska Natives and for payment into the Alaska Native Fund the percentage of royalties and revenues derived from the disposition of leasable minerals as provided for by section 9(c) of the act.

For the portion of this selection within U.S. Survey 4827 and 4828, we will proceed to patent when this decision becomes final. Survey has been requested on the remaining selected lands under group 146.

Enclosed are current status plats showing the tentatively approved lands.

In accordance with the regulations in 43 CFR 4.400, the applicant has the right of appeal to the Board of Land Appeals, Office of Hearings and Appeals. See enclosed form. If an appeal is to be taken, the notice of appeal must be filed in the Alaska State Office at 701 C Street, Box 13, Anchorage, Alaska 99513 within 30 days of the receipt of this decision. To avoid summary dismissal of the appeal, there must be strict compliance with the regulations.

/s/ Robert E. Sorenson
Chief, Branch of Lands
and Minerals Operations

Enclosures:
Form 1842-1
Regulations
Plats

cc:
Darryl Schaefermeyer
Assistant City Manager
City of Seward
P.O. Box 337
Seward, Alaska 99664

4th of July development needs large industry or several small

It would take a large industry to develop the site and create access to the 4th of July Creek area, a study by Arctic Environmental Engineers reveals. The study was up for public hearing at the City Council meeting Monday night. Though there was a capacity crowd in attendance, only three testified or asked questions.

Engineer Sid Clark introduced the study, and it was summarized by Franz Vail, who was project engineer for the study, which was funded with money from Outer Continental Shelf grants.

Clark told the audience that the study was contracted a year ago but went into high gear when the city bid to get the Alpetco refinery located here. He said his firm and CH2M-Hill worked together to produce the information which was presented to Alpetco. The completed study includes soils testing, assessment of the various means of access, possible industries that might make use of the site, topography, climate, depth of water and wind and atmospheric conditions which could determine what industries would be appropriate or even possible.

Vail said the site consists of two areas—the 650 acre valley floor and the 400 acre bench area above and to the north. He said prevailing winds could be expected to cleanse the air of any industrial smoke or smog, with north winds in the winter and south winds in summer. Just offshore the bay is some 100 feet deep, making a deep water port feasible, Vail added. Ground water studies are still being conducted by the U.S. Geological Survey and should be ready by fall. The valley is subject to flooding when the creek over-runs and the study includes suggestions on how best the creek might be moved. Vail said his firm had been in contact with the Department of Fish and Game which would agree to moving of the creek if fish rearing is not damaged or is enhanced.

Vail said the land is predominantly government owned, with only two tracts of privately owned land. Much of the state owned land has been claimed by the Kenai Peninsula Borough and the City of Seward, with the borough deferring to the City. Both Vail and Clark urged the City to begin getting easements from private landholders for both the site itself and possible road or railroad access.

Vail said a geological consultant had drilled test holes, which revealed that the bench area is predominantly bedrock, with gravel in the valley. The water table is at 30 feet. The tendency for avalanche at one slope brought the suggestion that a 500 foot safety zone be created.

Vail said transportation into the area can be by both land or water. Air traffic, other than by helicopter, would be impractical. A road could either go along the beach line (approx. cost $2½ million), or farther back above the bench and into the valley (at a cost of $4½ to $5½ million). A railroad link could be provided coming in from Bear Lake and along the bay.

Water access would depend on the type of ship, Vail said. With a dock costing anywhere from $5 to $20 million, depending on whether it was built to accommodate bulk or containerized cargo, rail barge, small boat harbor, etc.

The area would require all the basic utilities but an industry like petrochemical would be expected to generate its own power. A bottomfish development, smelter, or storage and transportation site would require city-provided electricity. Wastes could be taken care of with septic tanks or a small sewage treatment plant. The city could assist an industry in sewage treatment, getting federal and state support.

The study addressed four possible industries (although Clark pointed out many more were possible). It was pointed out that the creek would have to be relocated to make best use of the valley floor site, however. Estimated cost would be $20 million.

A petrochemical facility was estimated to cost $35 million. It would require a bulk terminal, using the upper bench for storage. Tankers and rail cars could be incorporated.

A bulk material transfer site to tie in with coal transportation or grain from Delta, would need railroad connections and probably utilize the higher road. It would cost an estimated $24 million.

A metal refinery was estimated to cost $27 million. It would also use the upper road and would require heavy power usage.

Clark said the area could be utilized by more than one industry, bringing more diversification to the economy. He added that although additional studies would no doubt be needed by a specific industry contemplating use of the area, the study itself was already superior to information available on other industrial sites in the state with the possible exception of Anchorage and Valdez. "And I think it is superior to information available on Valdez," he added.

Willard Midby testified at length, asking questions about various segments of the study. He doubted the bottomfish industry would ever materialize, "Because the Japanese control the processors". He said at a Corps of Engineers public hearing last fall 4th of July was not discussed as a possible Small Boat Harbor site—but the northeast corner of the bay had been. He felt ore transport was the most likely use of the area.

Bruce Trygstad asked if the study had addressed transport of coal with water through a pipeline. Clark replied in the affirmative, saying the pipeline could be located along the railroad.

Dale Lindsey, the private landholder in the area, wondered if the state is really committed to letting Seward select the land. He doubted the land policies of the present state administration. "The money I might make on the site is secondary," Lindsey said, "I think it is great this work is being done toward securing the site and feel the jobs that would result are the most important factor," he added.

City Manager Johnny Johnson said the largest shipbuilding firm in the nation is interested in locating a facility in Alaska—he added that the study information will be going to that firm in the next few days. "They are asking the state to supply information on possible sites—we already have the information they need with this study," he added. He said the firm estimates spending $50 for a ship building and repair facility so the $20 to $40 million it would take to develop 4th of July would not daunt them.

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A public hearing was held on the Fourth of July Creek Feasibility Study during the April 23, 1979 Seward City Council meeting. The local newspaper's account of that public hearing is presented here.